

# WATER SHORTAGE CONDITIONS REPORT

February 2001



Environmental Monitoring and Assessment Division  
SFWMD

## **ACKNOWLEDGEMENTS**

Eric Swartz and Geoff Shaughnessey created the February map of District rain areas (Figure 2). Donna Rickabus produced the data of pumpage used in Table 3. Jeff Herr wrote the text for the groundwater section. Scott Burns provided the section on At Risk Utilities.

# TABLE OF CONTENTS

ACKNOWLEDGEMENTS _____	i
TABLE OF CONTENTS _____	ii
INTRODUCTION _____	1
Background _____	1
MONTHLY RAINFALL _____	1
FLOWS, WATER LEVELS AND STORAGE _____	4
Lake Kissimmee _____	4
Lake Istokpoga _____	4
Indian Prairie _____	4
Upper East Coast _____	10
Lake Okeechobee _____	10
Water Conservation Areas _____	19
GROUND WATER _____	19
Monthly Volume Pumped _____	19
Well Water Levels _____	19
Upper East Coast _____	37
Surficial Aquifer System _____	37
Lower East Coast – Miami-Dade & Broward Counties _____	37
Biscayne Aquifer _____	37
Lower West Coast _____	37
Surficial Aquifer _____	37
Lower Tamiami Aquifer _____	37
Mid Hawthorn Aquifer _____	37
Sandstone Aquifer _____	38
Orange County _____	38
Floridan Aquifer _____	38
Utilities at Risk _____	38
SUMMARY _____	39

# INTRODUCTION

## Background

This monthly water shortage conditions report was prepared in response to the water shortage conditions in the South Florida Water Management District. **ALL DATA ARE PROVISIONAL AND SUBJECT TO CHANGE.** The information provides a monthly snap shot of hydrologic conditions in various parts of the District. Rainfall, flows, water levels and storage information are provided graphically and in tabular format. Figure 1 shows the areas that were under water use restrictions as of January 17, 2001. There were no changes in restrictions from the January 2001 report.

**Map of Water Restriction Areas**

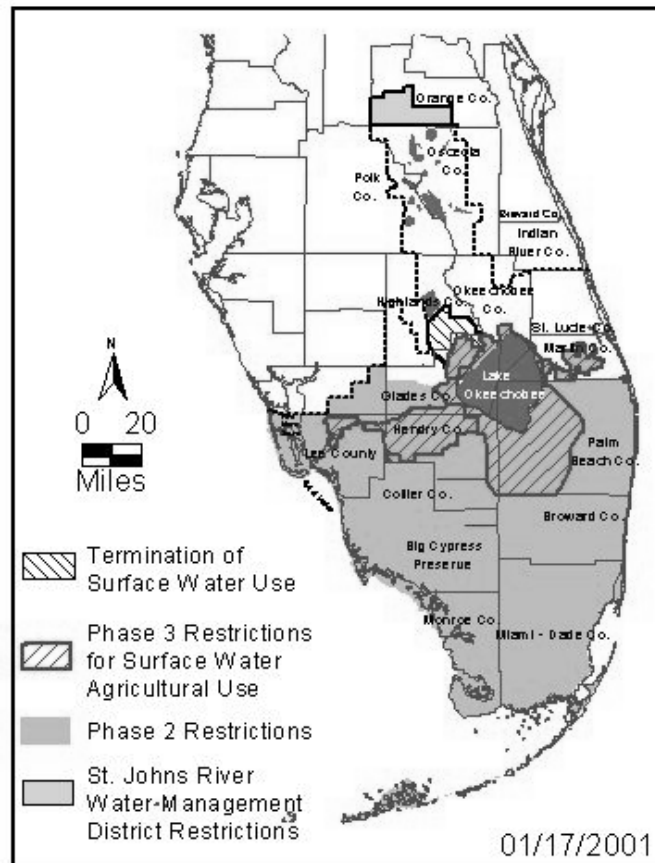


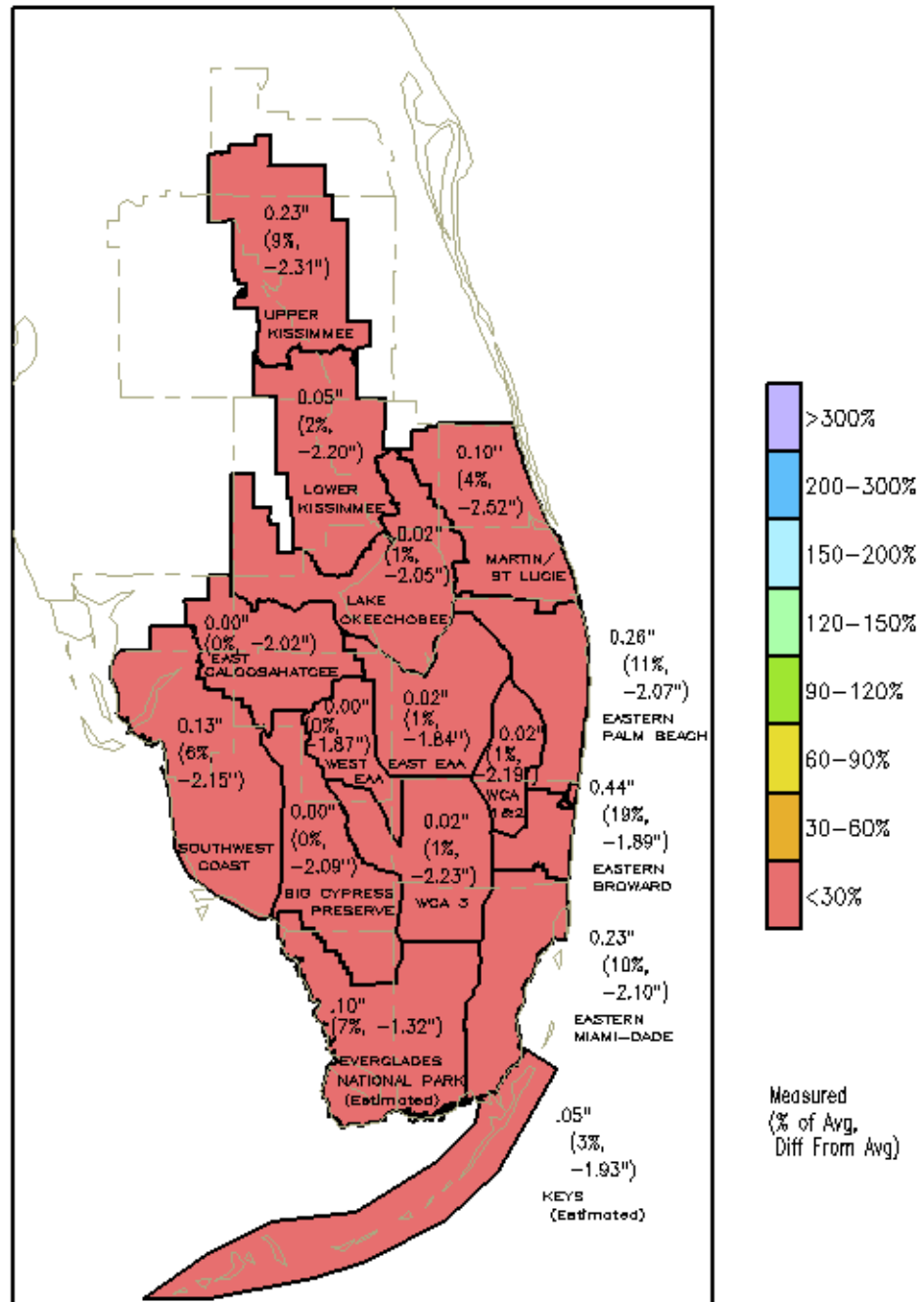
Figure 1.

## MONTHLY RAINFALL

February 2001 was a much drier month than average throughout the District. The average rainfall deficit for the District was 96 percent below the historical monthly average. The average monthly rainfall for each rain area, change from historical average and percent change from historical average are depicted in Figure 2. Percent departure from historical average rainfall for February is depicted in Figure 3 for all rain areas.



# SFWMD Rainfall 02-feb-2001 to 01-mar-2001



DISTRICT-WIDE: 0.09" (4%, -2.14")

GRADS: COLA/IGES

Figure 2.

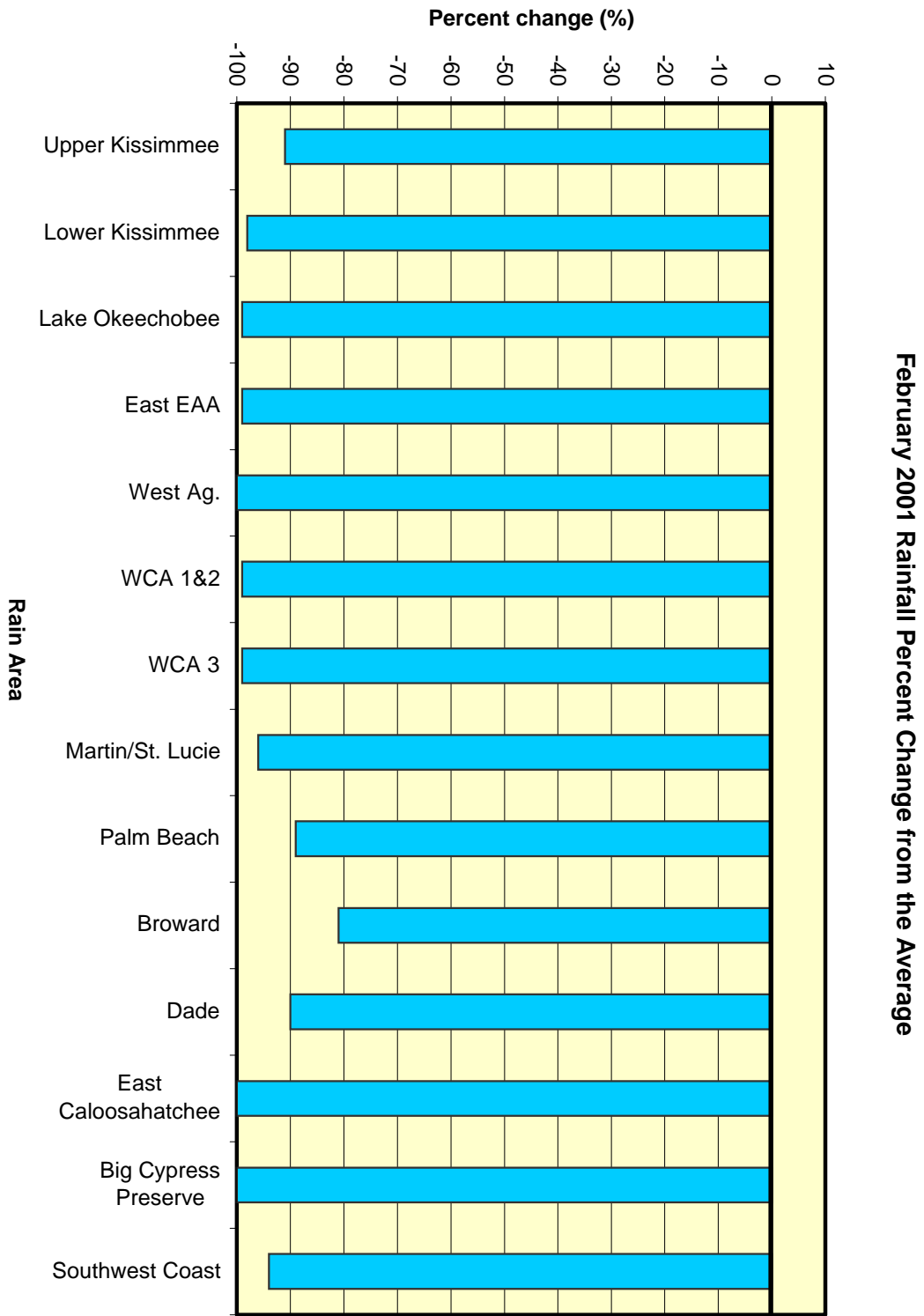


Figure 3.

## **FLOWS, WATER LEVELS AND STORAGE**

Flow through selected structures, water levels and storage in lakes and Water Conservation Areas are presented in graphic and tabular formats. Figure 4 shows the sites used to report the effects of drought conditions on Lake Kissimmee, Lake Istokpoga and the Indian Prairie basin.

### **Lake Kissimmee**

There was no outflow from Lake Kissimmee through structure S65 in February 2001. The water level (stage) of the lake decreased from 48.89 to 48.69 ft NGVD during the month. Figure 5 shows daily water levels for Lake Kissimmee.

### **Lake Istokpoga**

There were 20,301 acre-ft of water discharged from Lake Istokpoga through structure S68 during February to lower the Lake water level to 36.50 ft NGVD for an environmental enhancement project. Water level declined from 37.59 to 36.58 ft NGVD through February. Daily water levels are shown in Figure 6.

### **Indian Prairie**

There was no outflow from the C-40 canal through structure S72. Sixty-five acre-ft of water were released from the C-41 canal at S71. G207 pumped 140 acre-ft of water from Lake Okeechobee into the C-41 canal and G208 pumped 124 acre-ft into the C-40 canal. Headwater level in the C-40 canal at S75 increased from 25.87 to 26.14 ft NGVD as the result of water releases from Lake Istokpoga. The minimum operational/regulatory level is 22.5 ft NGVD. At S72 in the C-40 canal, the headwater level increased from 18.95 to 20.64 ft NGVD. The minimum operational/regulatory level is 17.7 ft NGVD. The headwater level in the C-41 canal at S70 increased from 25.82 to 26.09 ft NGVD as the result of water releases from Lake Istokpoga. The minimum operational/regulatory level is 22.5 ft NGVD. At S71 in the C-41 canal, the headwater level rose from 18.59 to 19.82 ft NGVD. The minimum operational/regulatory level is 17.0 ft NGVD. The headwater level in C-41A canal at S83 increased from 28.61 to 31.94 ft NGVD as the result of water releases from Lake Istokpoga. The minimum operational/regulatory water level is 29.0 ft NGVD. Figures 7, 8, and 9 depict these water levels in the Indian Prairie area. Table 1 summarizes monthly flows through structures on the C-40, C-41 and C-41A canals.

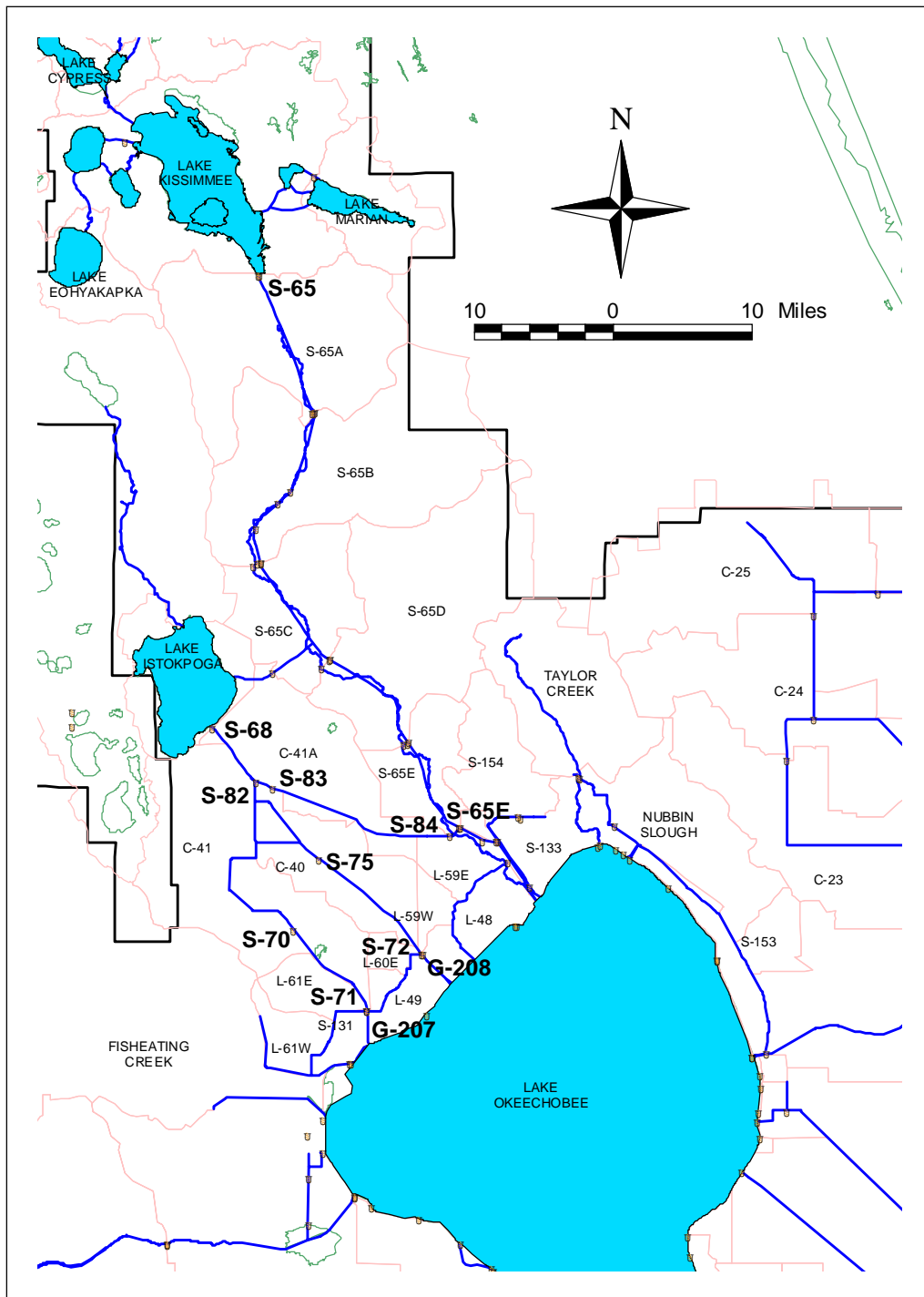


Figure 4. Lake Kissimmee, Lake Istokpoga and Indian Prairie Water Level and Flow Monitoring Locations



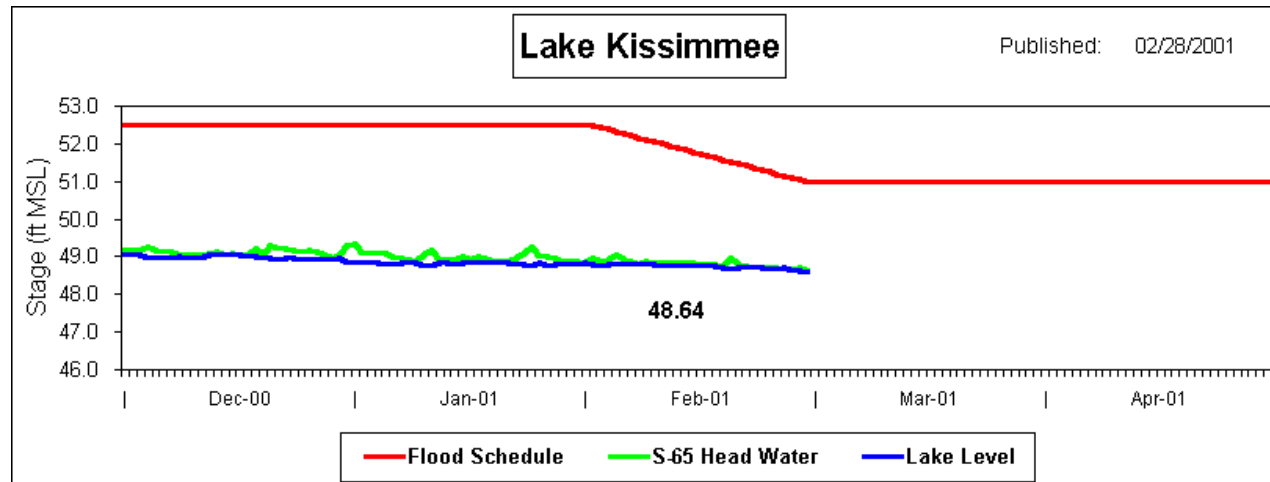


Figure 5.

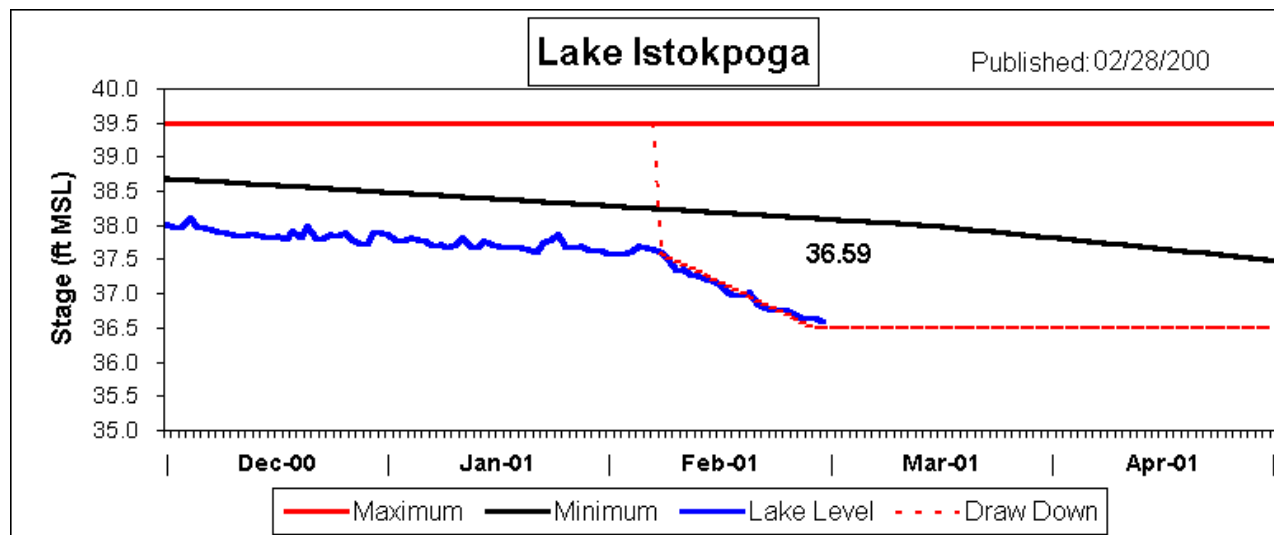


Figure 6.

C-40 Canal Average Daily Water Surface Elevation

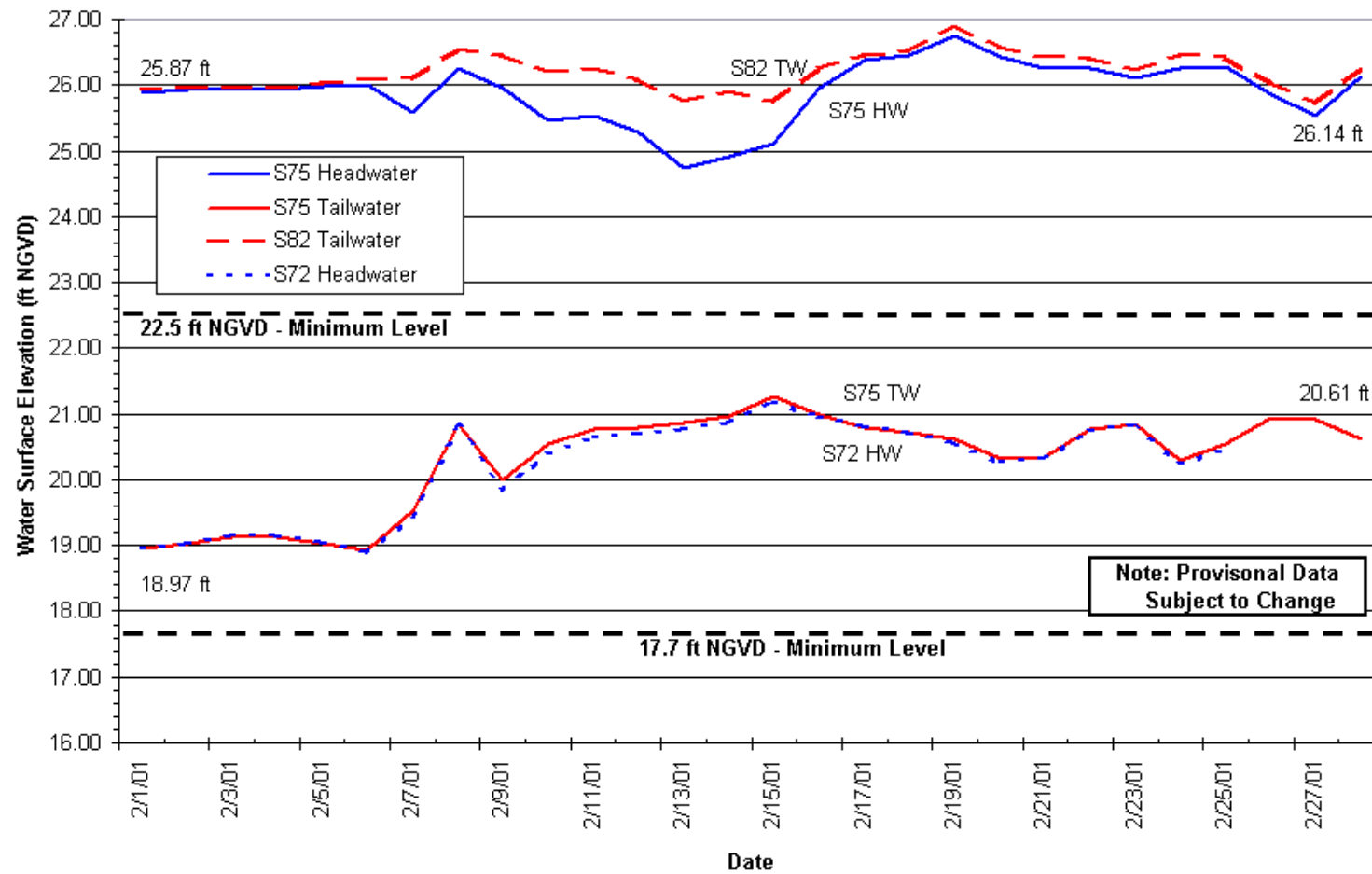


Figure 7.

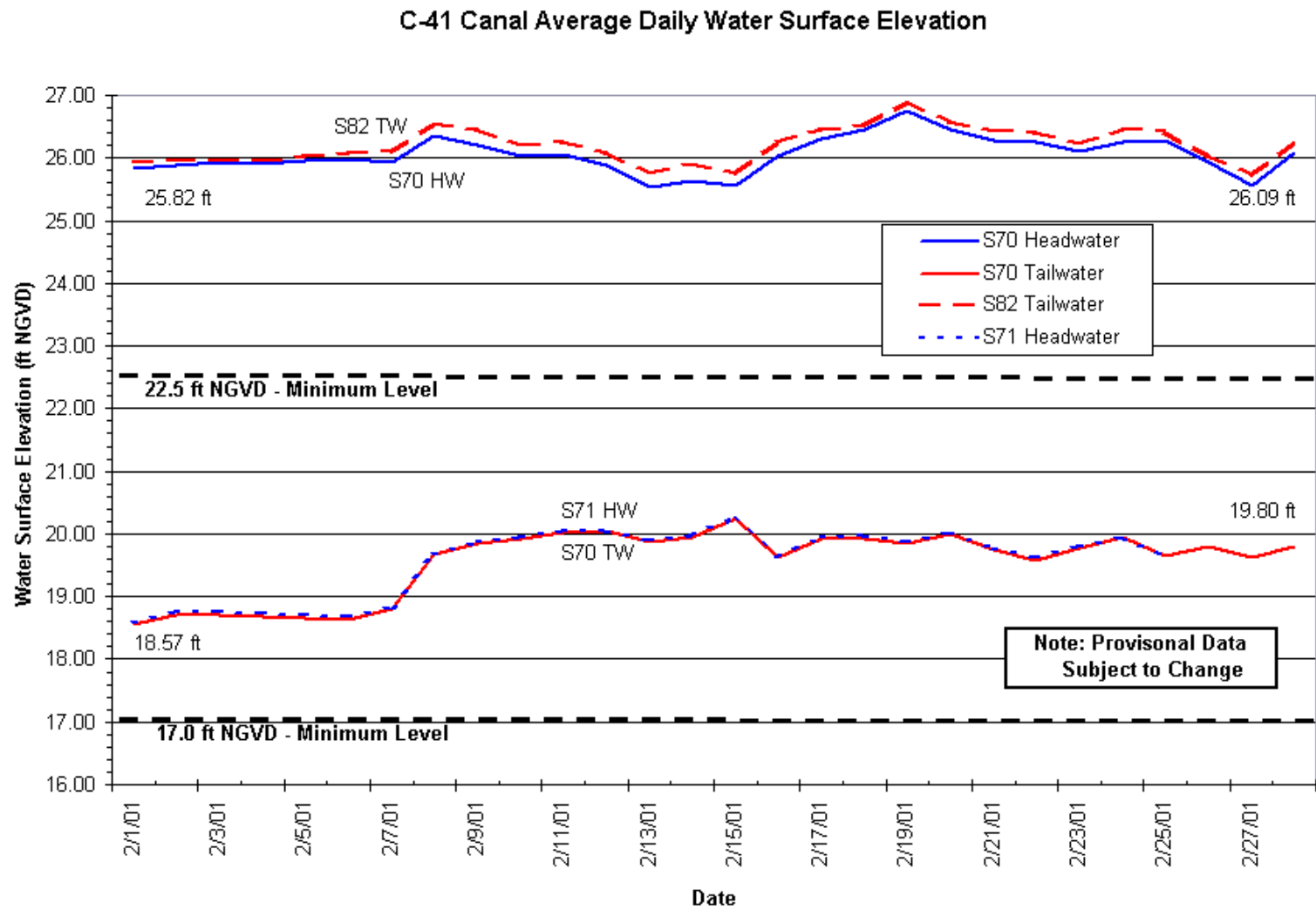


Figure 8.

C-41A Canal Average Daily Water Surface Elevation

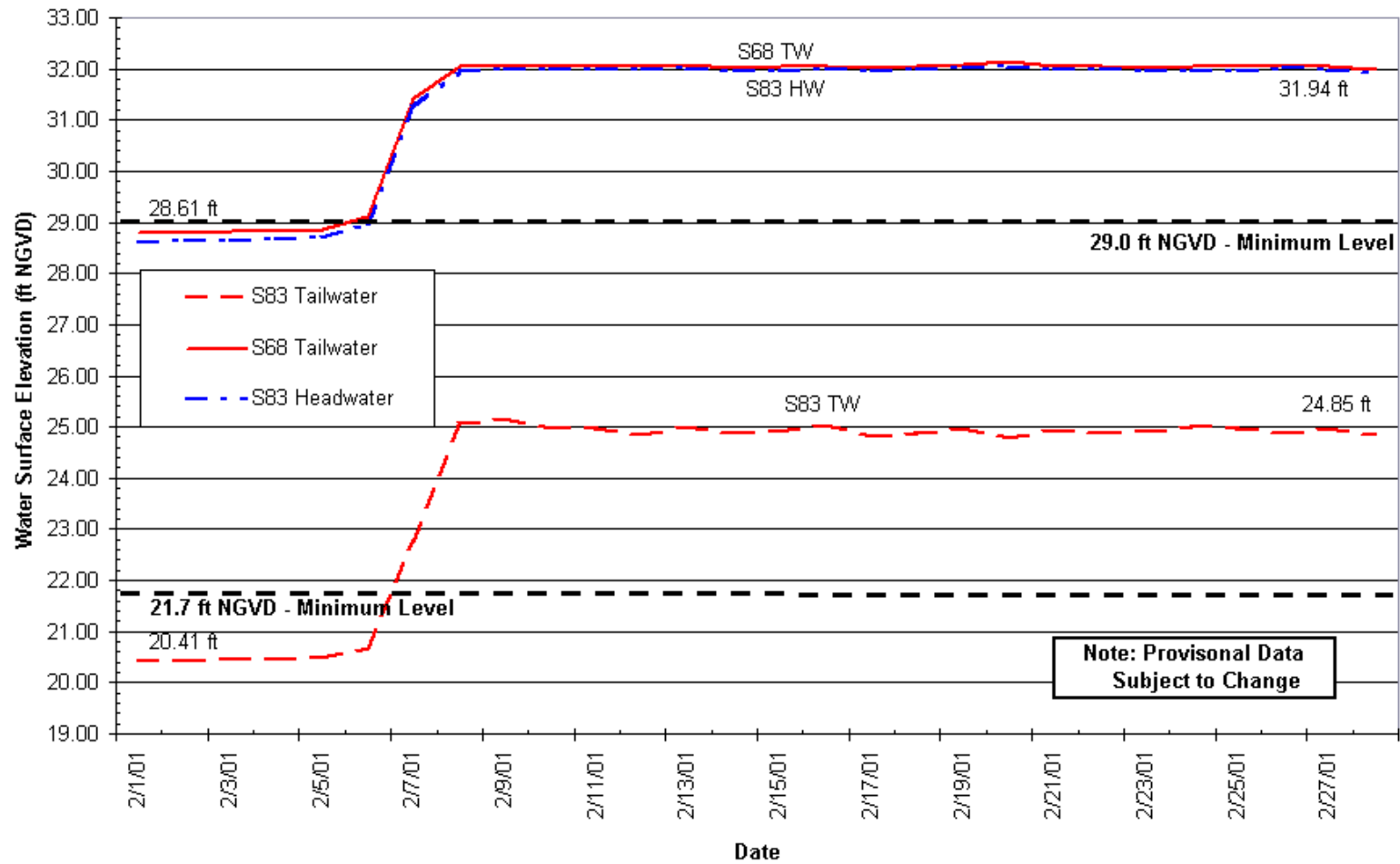


Figure 9.

**Table 1.**

<b>Indian Prairie Flows - February 2001</b>	
<b>Station</b>	<b>Flow Volume (ac-ft)</b>
<b>G207</b>	<b>140</b>
<b>G208</b>	<b>124</b>
<b>S68</b>	<b>20,301</b>
<b>S70</b>	<b>3,822</b>
<b>S71</b>	<b>65</b>
<b>S72</b>	<b>0</b>
<b>S75</b>	<b>5,110</b>
<b>S82</b>	<b>12,558</b>
<b>S83</b>	<b>4,739</b>
<b>S84</b>	<b>20</b>

### **Upper East Coast**

The headwater level in the C-23 canal at S97 decreased from 15.78 to 14.36 ft NGVD during February. The minimum operation/regulatory level is 14.0 ft NGVD. The tailwater level at S97 decreased from 7.89 to 7.69 ft NGVD. The minimum operational/regulatory water level is 4.0 ft NGVD. The headwater level at S49 in the C-24 canal fell from 16.39 to 13.97 ft NGVD. The minimum operation/regulatory level is 14.0 ft NGVD. The headwater level at S99 in the C-25 canal fell from 14.86 ft to 14.57 ft NGVD during February. The minimum operation/regulatory level is 14.0 ft NGVD. The tailwater level at S99 remained approximately the same at 12.04 ft NGVD throughout the month. The minimum operational/regulatory water level is 8.0 ft NGVD. Figure 10 shows the location of structures S97, S49 and S99. Figures 11, 12 and 13 depict daily mean water levels in the C-23, C-24 and C-25 canals.

### **Lake Okeechobee**

The average water level of Lake Okeechobee declined from 10.86 to 10.56 ft NGVD in February. Total storage was estimated at 2,222,120 acre-ft while gravitationally available storage was 338,120 acre-ft (Figure 14). The estimated evaporation for the lake was 4.0 inches for the month (Figure 15). Due to the drought conditions, inflows to the lake were 1,865 acre-ft compared to the historic February average of 138,100 acre-ft. Total outflow from the lake was 36,818 acre-ft. Figure 16 shows the service allocation areas and structure locations for Lake Okeechobee. Table 2 shows inflows and outflows by structure and by service allocation area. Daily Lake Okeechobee inflows and outflows are shown in Figure 17.

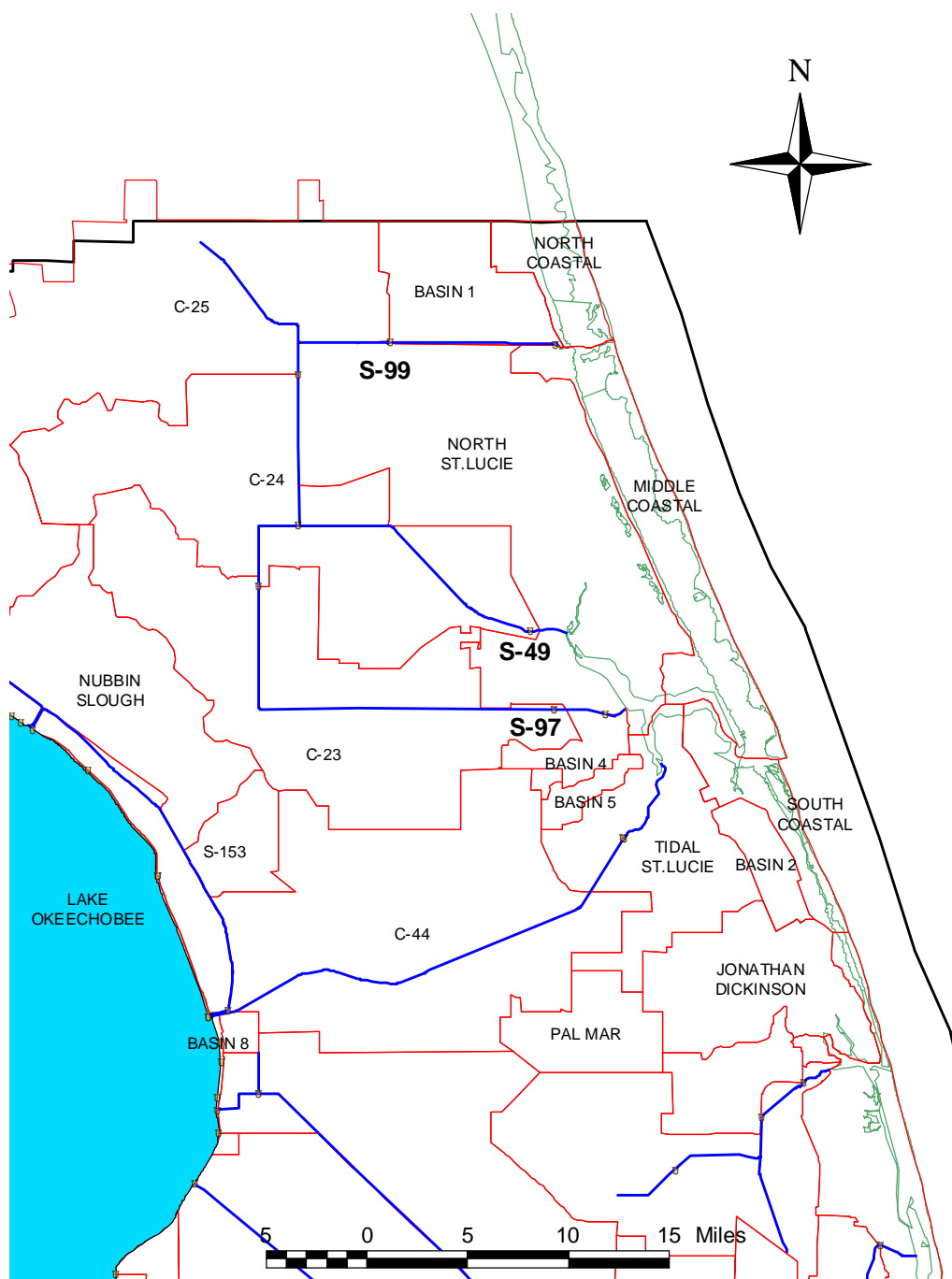


Figure 10. Upper East Coast Water Level Monitoring Locations

### C-23 Canal Average Daily Water Surface Elevation

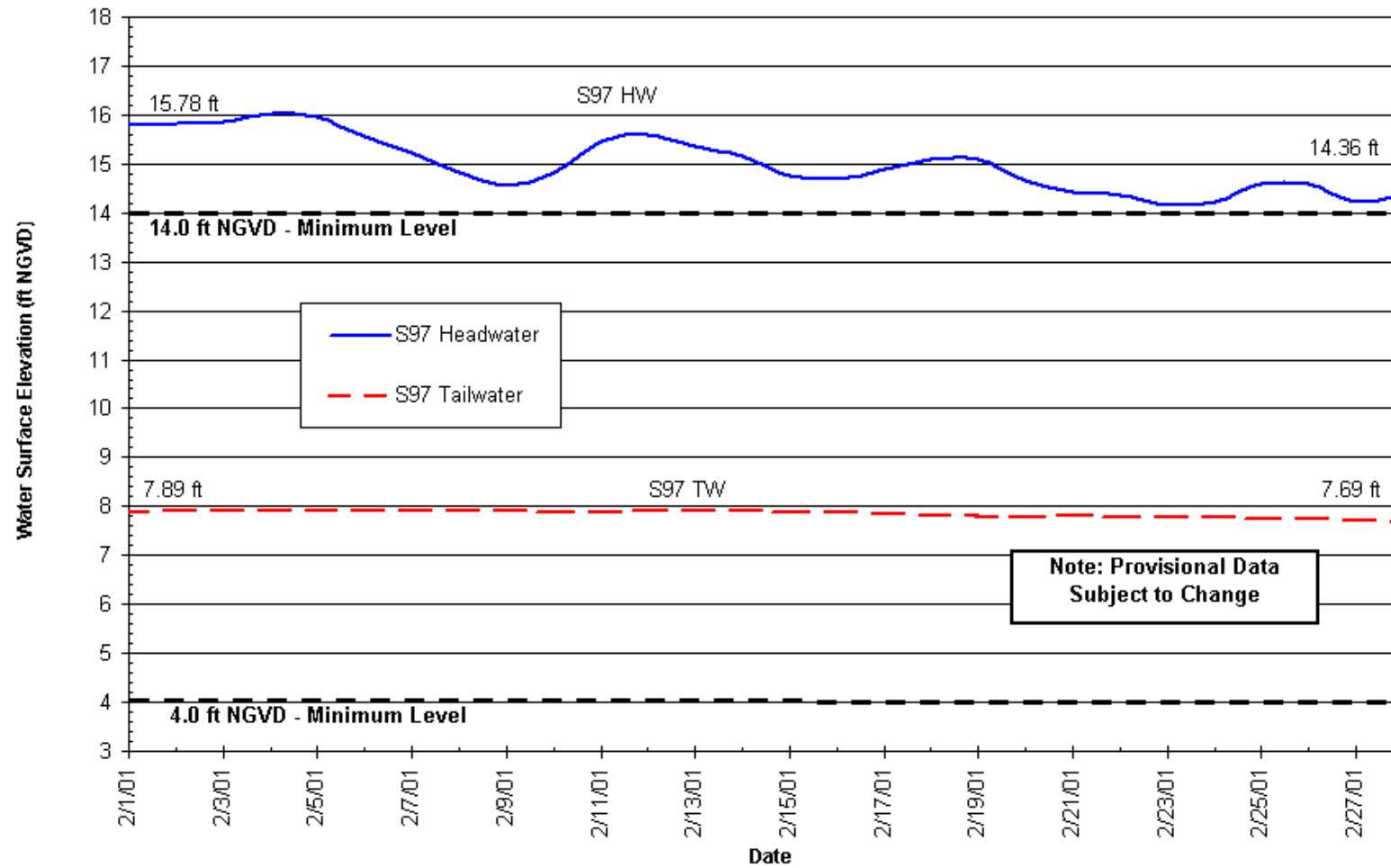


Figure 11.

### C-24 Canal Average Daily Water Surface Elevation

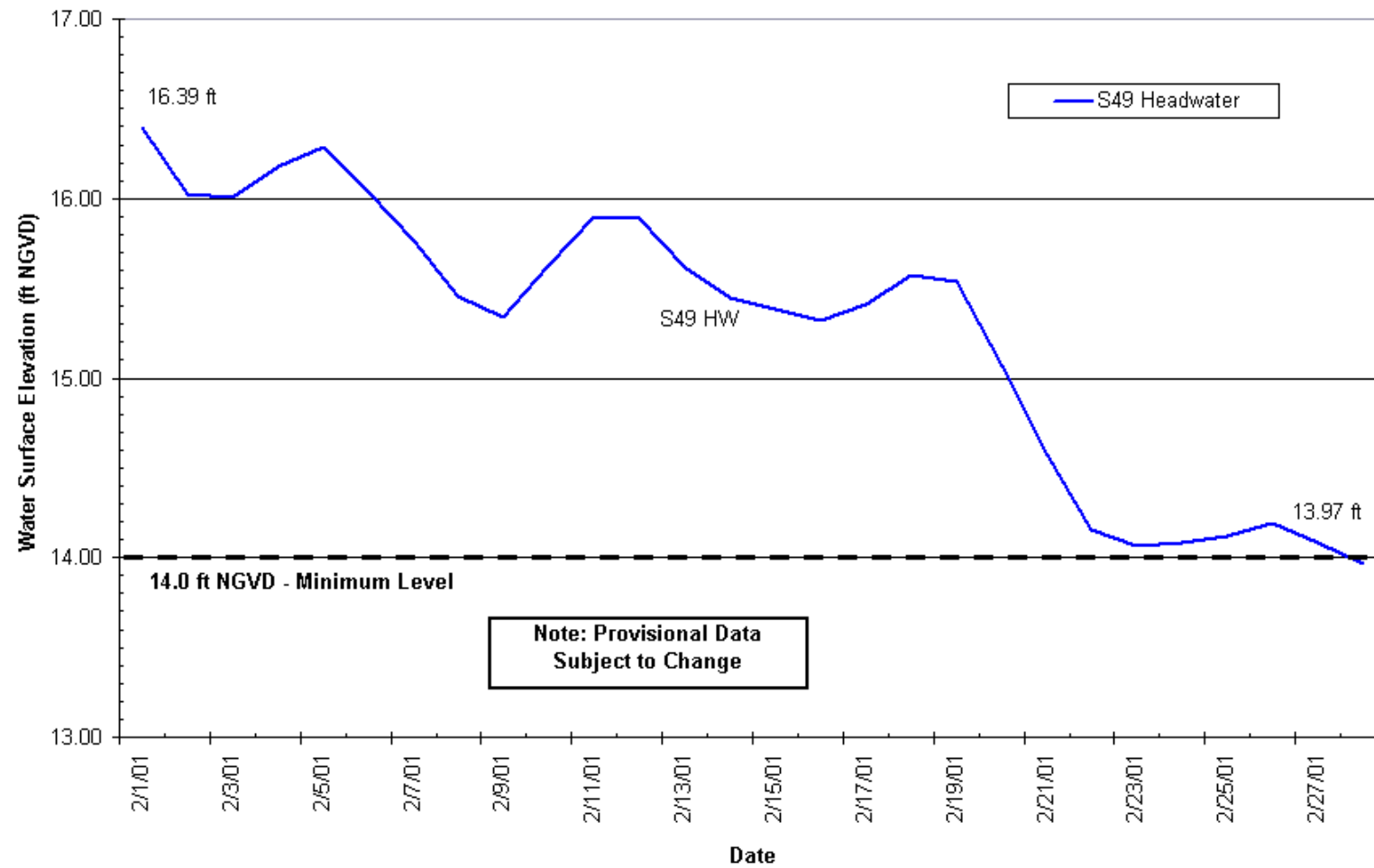


Figure 12.



### C-25 Canal Average Daily Water Surface Elevation

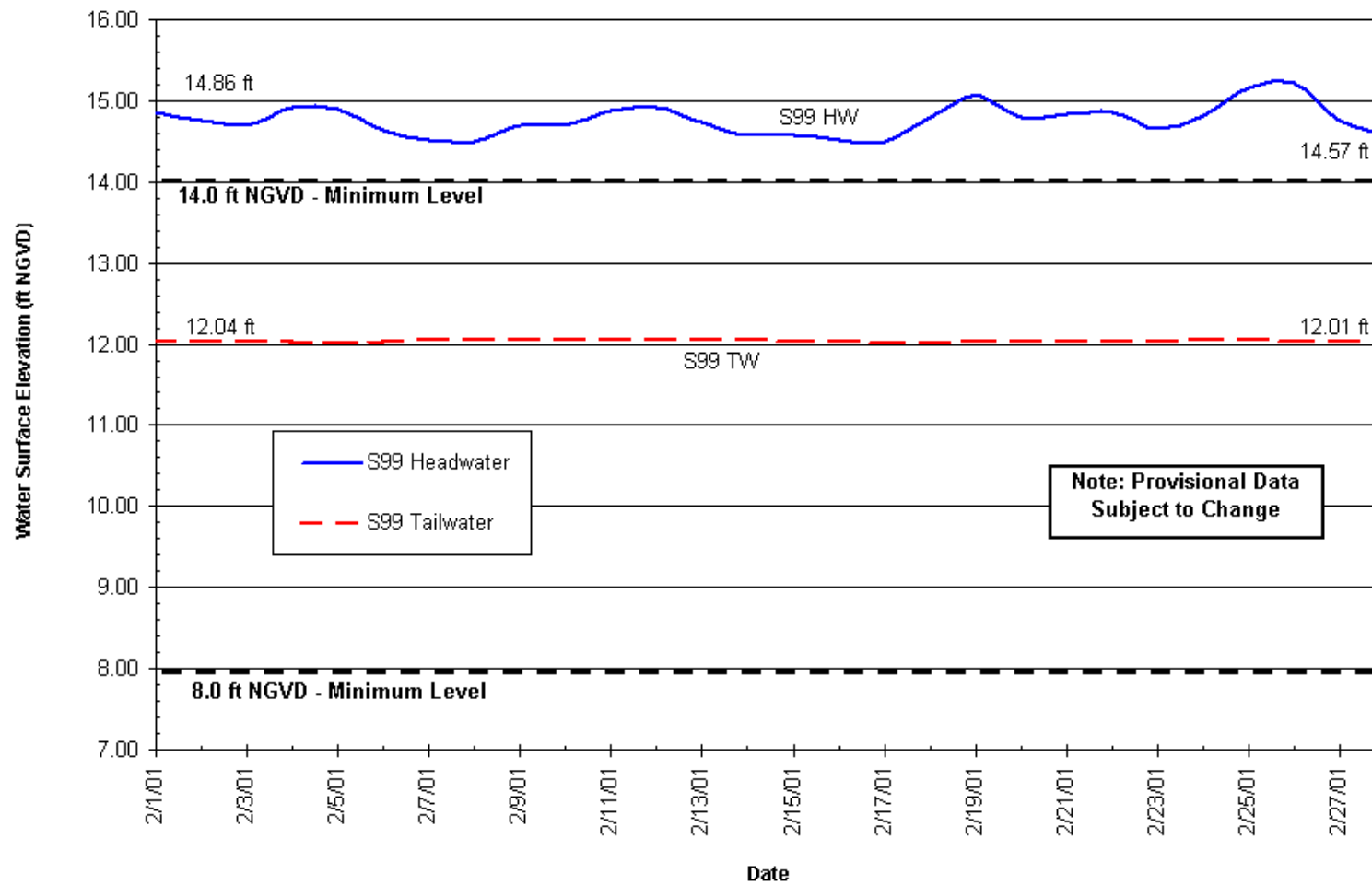


Figure 13.

# **Lake Okeechobee - Water Surface Elevation and Storage February 2001**

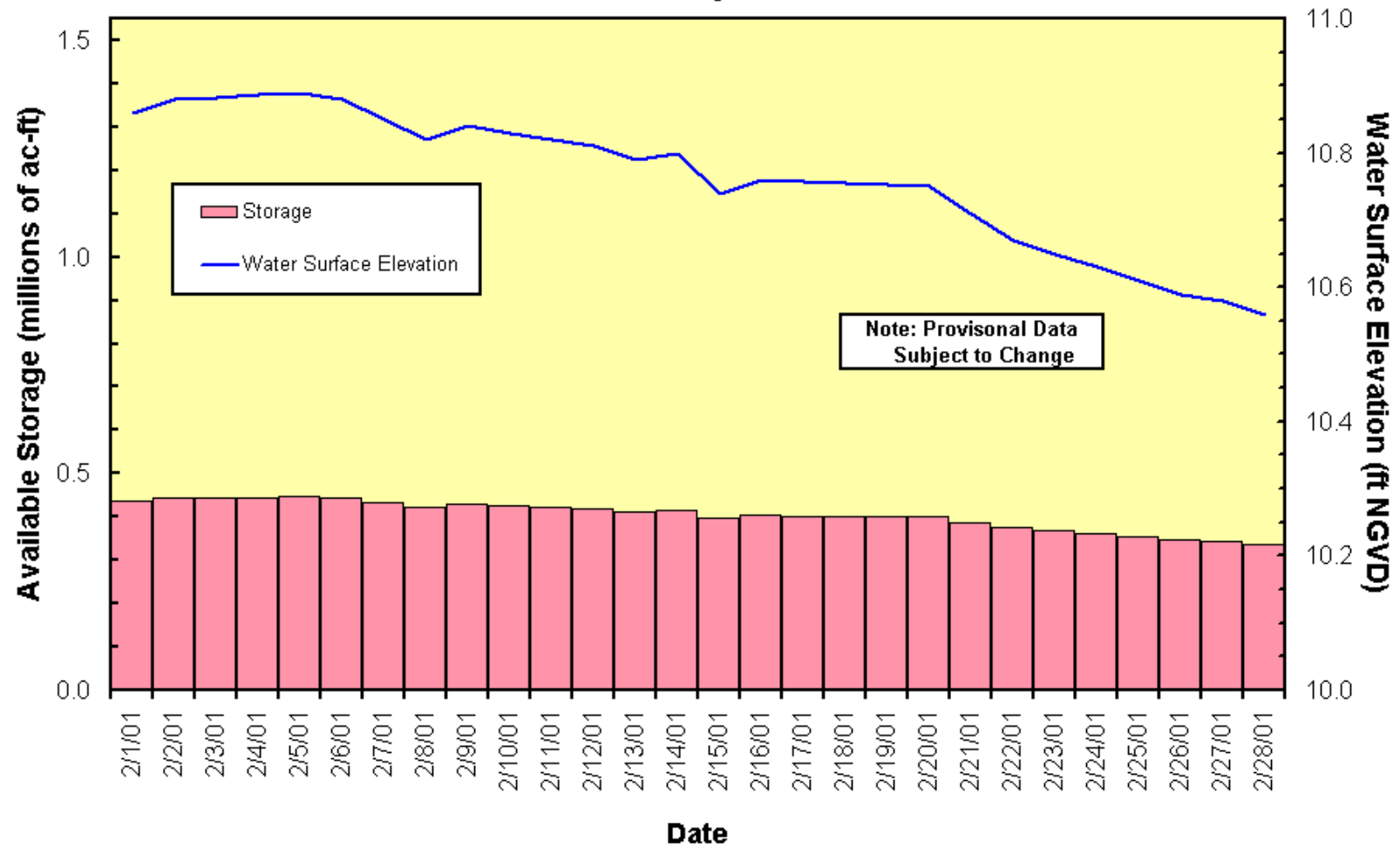


Figure 14.

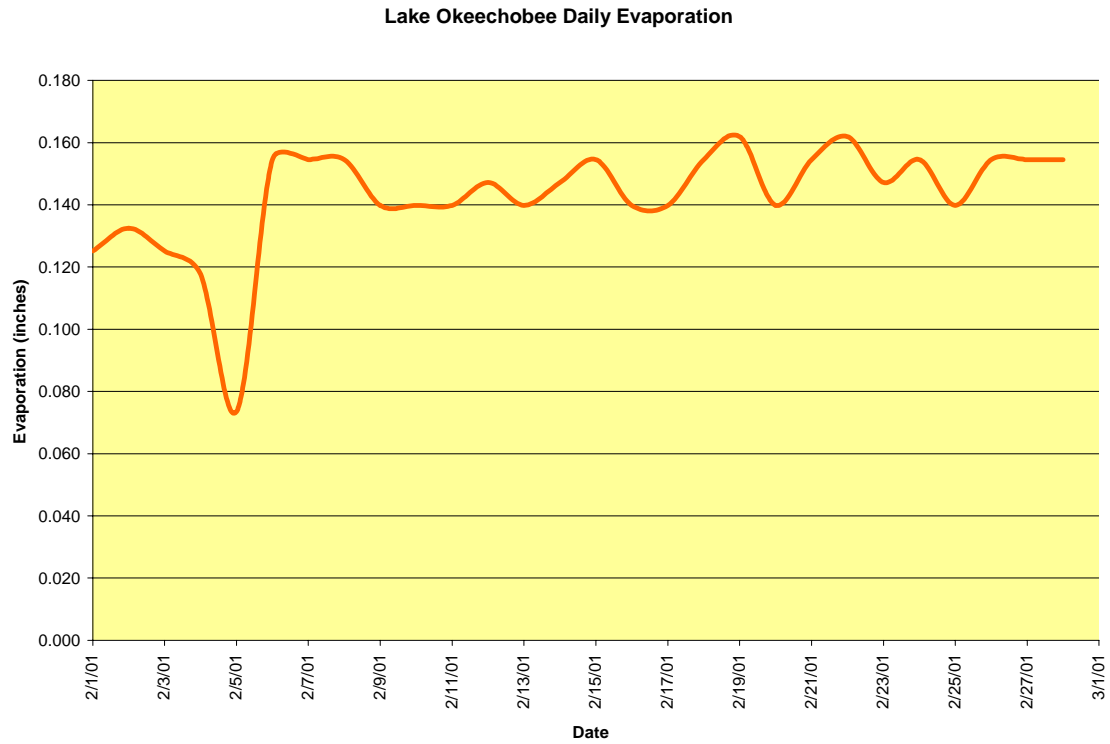


Figure 15.

### Lake Okeechobee Service Allocation Areas

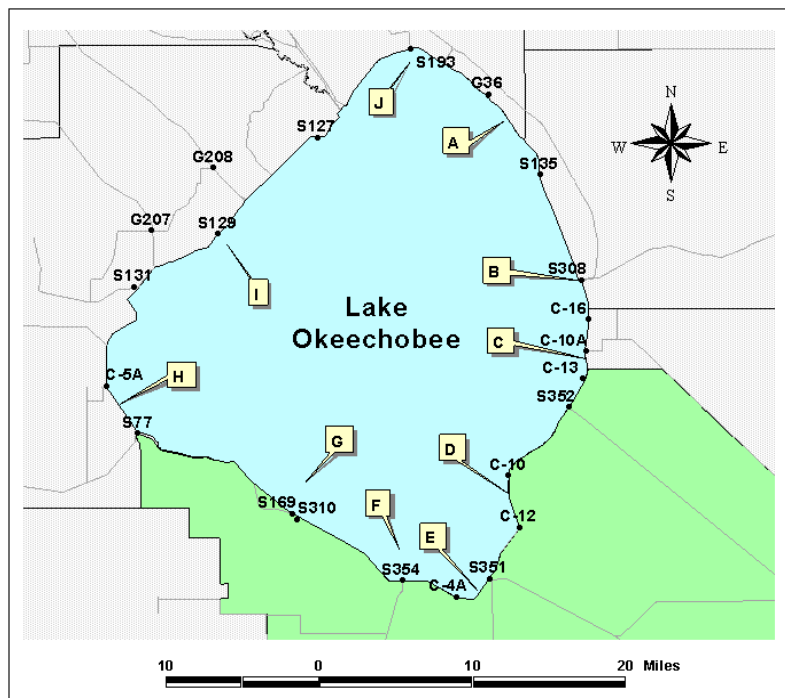


Figure 16.

**Table 2.**

Lake Okeechobee Flow for February 2001

Sub-Area On Figure16	Supply-Side Management Sub-Areas	Controlled by Structure	DBKEY	Inflow Month Total (ac-ft)	Outflow Month Total (ac-ft)
A	NORTHEAST LAKE SHORE	S-135 pump	15801	0	0
		S-135 gate	15800	0	0
		S-135 lock		0	999
		G-36 lock (USGS data)		317	134
		<b>SUBTOTAL</b>		317	1,115
B	ST. LUCIE (C-44)	S-308 4-gates (COE data)	DJ239	0	4,589
		S308 (0700 - 2100)(COE data)		0	4,393
		S-308 lock (COE data)		0	20
		<b>SUBTOTAL</b>		0	4,609
C	WPB CANAL & L-8	S-352 2-gates	FF581	0	5,052
		C-10A (USGS data)	02855	613	298
		C-13		0	0
		C-16		0	0
		<b>SUBTOTAL</b>		613	5,351
D	E.BEACH & E.SHORE WCD	C-10 (pump- private)	15645	0	237
		C-12 (pump-private)	15646	0	250
		<b>SUBTOTAL</b>		0	487
E	N.NEW RIVER & HILLSBORO	S-351 3-gates	HA461	0	7,845
		C-4A (pump-private)		0	205
		<b>SUBTOTAL</b>		0	8,050
F	MIAMI CANAL BASIN	S-354 2-gates	H6940	0	4,377
		<b>SUBTOTAL</b>		0	4,377
G	C-21 & S-236 BASINS	S-310 lock (COE data)		105	2,031
		S-169 3-gates	15590	78	2,113
		<b>SUBTOTAL</b>		105	2,031
H	CALOOSAHATCHEE (C-43)	S-77 4-gates (COE data)	DJ235	0	7,249
		S77 (0700 - 2100) (COE data)		0	7,305
		S-77 lock (COE data)		0	12
		C-5A 1-gate		0	2,519
		<b>SUBTOTAL</b>		0	9,780
I	NORTHWEST LAKE SHORE	G-207 pump (135cfs)	G5165	0	140
		G-208 pump (135cfs)	G5166	0	124
		S-127 pump	15820	0	0
		S-127 gate	15819	0	0
		S-127 lock		0	0
		S-129 pump	15824	0	0
		S-129 gate	15823	0	282
		S-131 pump	15718	0	0
		S-131 gate	04042	0	0
		S-131 lock		0	0
		<b>SUBTOTAL</b>		0	545
J	NORTH LAKE SHORE	S-193 lock		829	381
		<b>SUBTOTAL</b>		829	381
	OTHER INFLOW STRUCTURES	S-4 pump	15733	0	0
		S-71 gates	15866	0	65
		S-72 gate	15770	0	0
		S-84 gate	15788	0	20
		S65E	KO585	0	0
		S-154 culvert	15919	0	6
		S133 pump	15829	0	0
		S-191 gate	15804	0	0
		FISHP_O (USGS)	00090	M	M
		S-236 pump	pref	M	M
		C-12A	pref	M	M
		<b>SUBTOTAL</b>		0	91
		<b>TOTALS</b>		1,865	36,818

NOTE: Provisional Data Subject to Change.

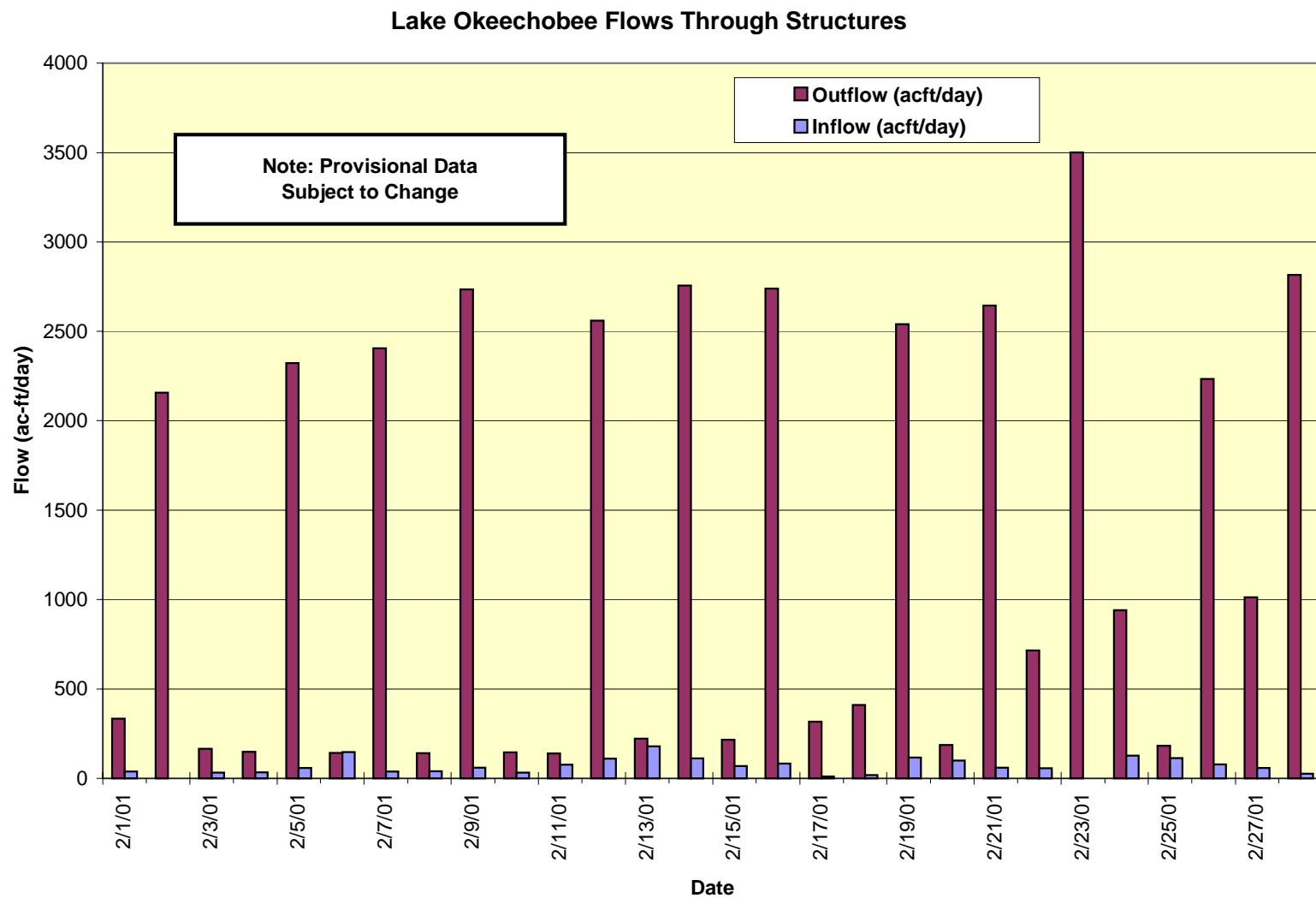


Figure 17.

## **Water Conservation Areas**

Figure 18 shows the location of structures where data were collected for conditions in the Water Conservation Areas. The average water level in Water Conservation Area 1 declined from 15.92 to 14.29 ft NGVD. The average estimated ground elevation in WCA 1 is 14.0 ft NGVD. Total storage at the end of February was estimated at 35,020 acre-ft while available storage was 28,620 acre-ft. Outflows from Water Conservation Area 1 through structures G94A, B, and C were 10,286 acre-feet, through S39 5,746 acre-ft and through S5AS 2,998 acre-ft. Total outflow was 19,030 acre-ft. Daily flow volumes for these structures are depicted in Figure 19.

The average water level in Water Conservation Area 2 declined from 11.02 to 10.35 ft NGVD. The average estimated ground elevation in WCA 2 is 11.0 ft NGVD. Total storage at the end of February was estimated at 24,220 acre-ft; available storage was -3,780 acre-ft. Outflow from Water Conservation Area 2 through structure S38 was 3,781 acre-ft. There was no flow through S34.

The average water level in Water Conservation Area 3 declined from 9.37 to 8.97 ft NGVD. The average estimated ground elevation in WCA 3 is 7.5 ft NGVD. Total storage at the end of February was estimated at 359,000 acre-ft; available storage was 331,000 acre-ft. Figures 20, 21 and 22 depict water levels and storage in Water Conservation Areas 1, 2 and 3, respectively.

## **GROUND WATER**

### **Monthly Volume Pumped**

Eight counties currently under water use restrictions report the quantity of water pumped for water supply purposes. The average daily amount of water pumped for each county in February is shown in Table 3. All counties show a decrease in the average daily volume of water pumped for the month in comparison to February 2000. Hendry and Monroe Counties reported a 1 percent increase in average daily volume of water pumped in comparison to the amount reported for November 2000, the month prior to water restrictions being imposed.

### **Well Water Levels**

A number of wells were selected to represent conditions in the major aquifers used to meet water supply needs. The locations of these wells are shown in Figure 23. Figures 24 through 33 show the water level in these wells and associated statistical levels in the Upper East Coast, Lower East Coast and West Coast regions by aquifer. The figures were obtained from the USGS Miami Subdistrict web site and are based on provisional data. The following summary was compiled from a network of 44 real-time monitoring wells.

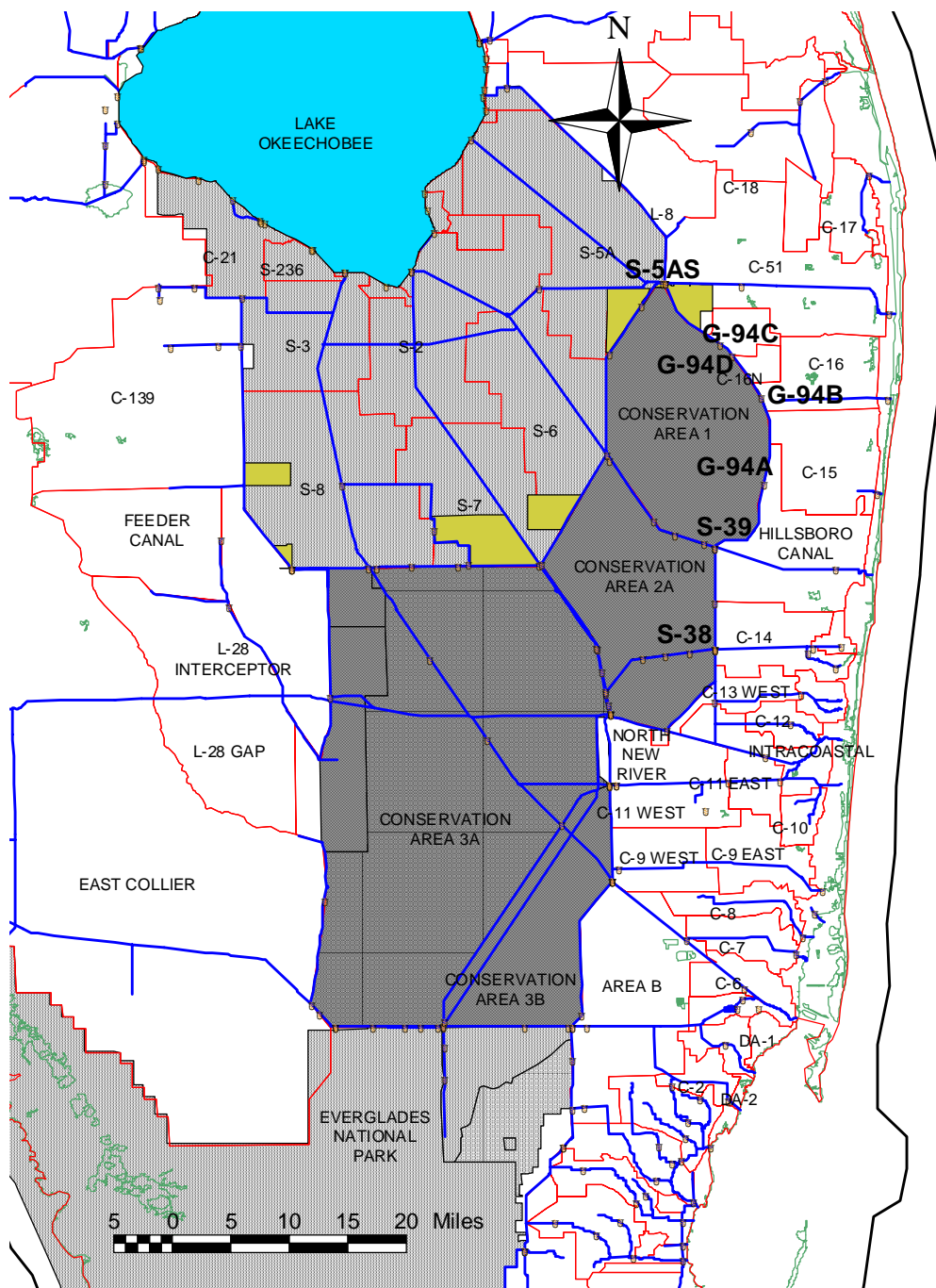


Figure 18. Water Conservation Area Flow Monitoring Locations

# **Daily Flow Volume From WCA1 February 2001**

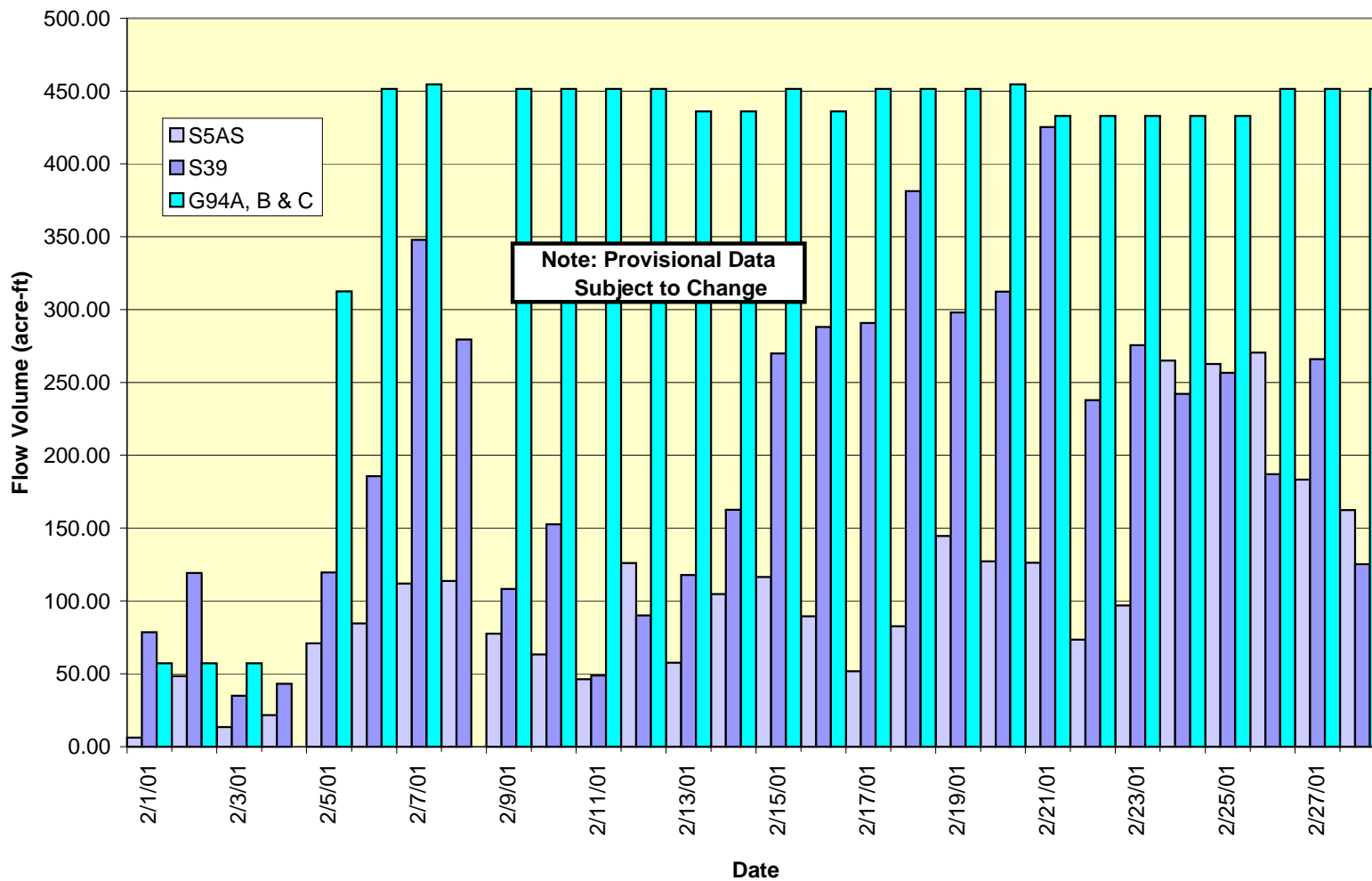


Figure 19.



# **WCA1 - Water Surface Elevation and Storage** **February 2001**

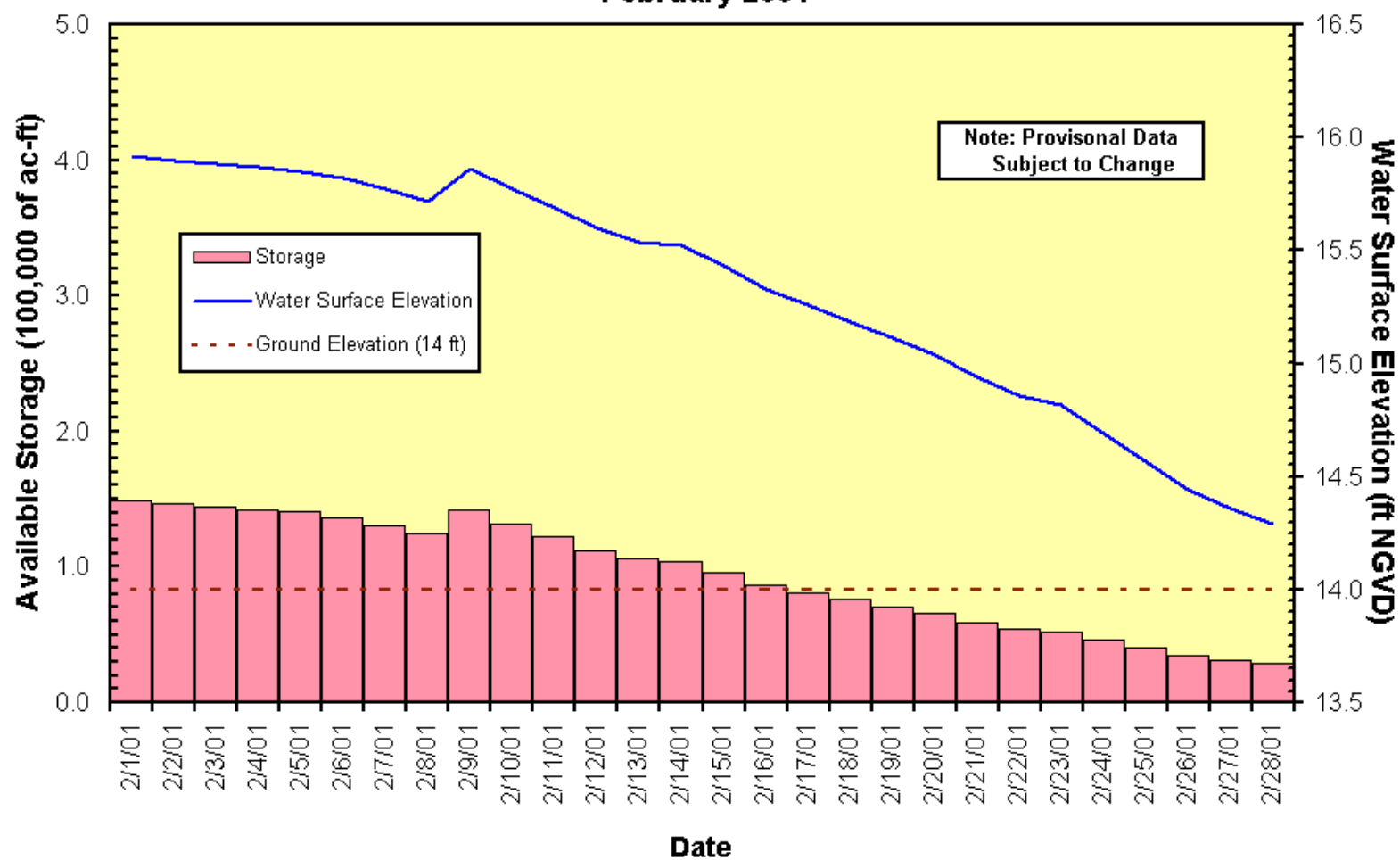


Figure 20.

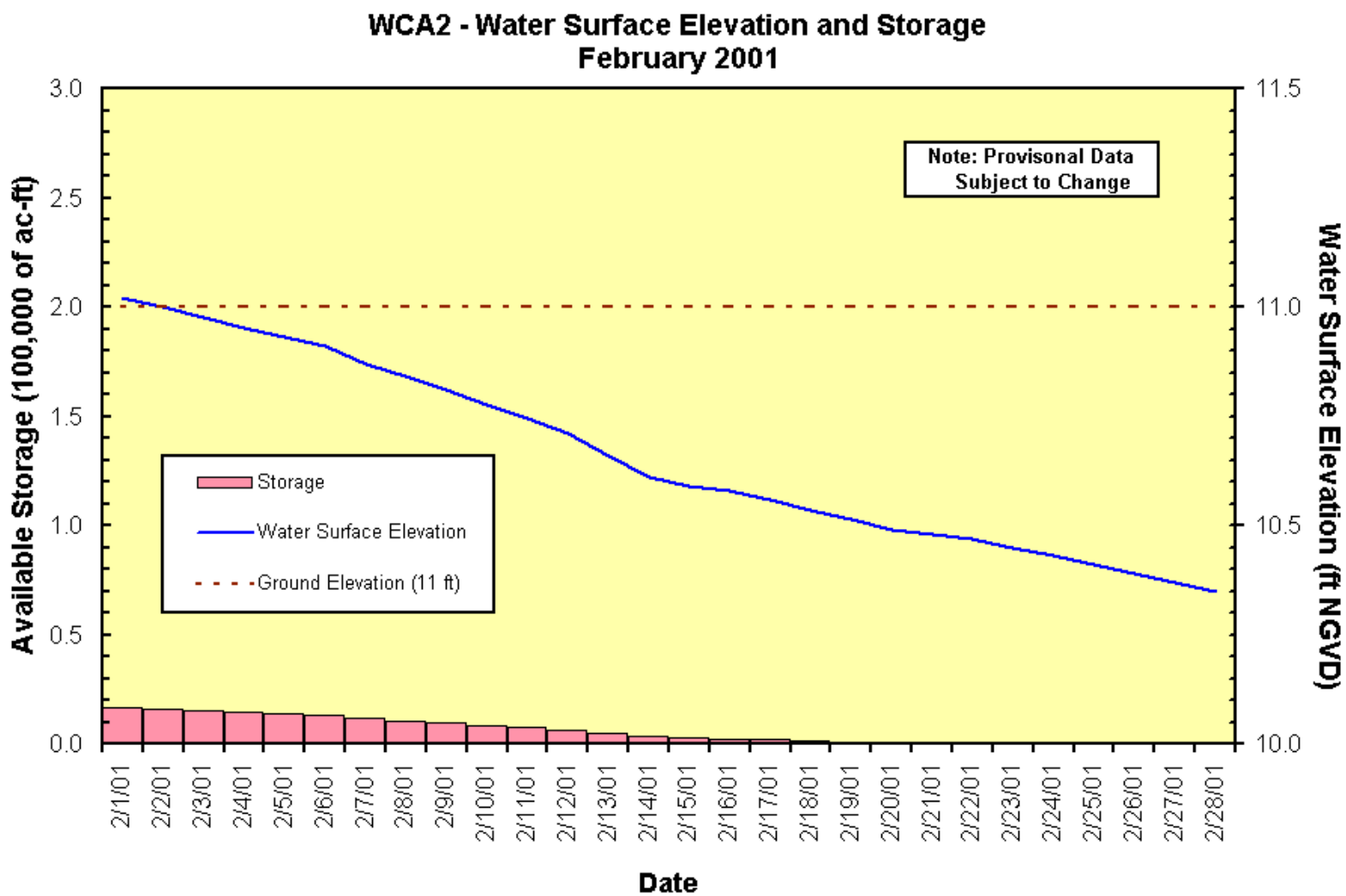


Figure 21.

### WCA3 - Water Surface Elevation and Storage February 2001

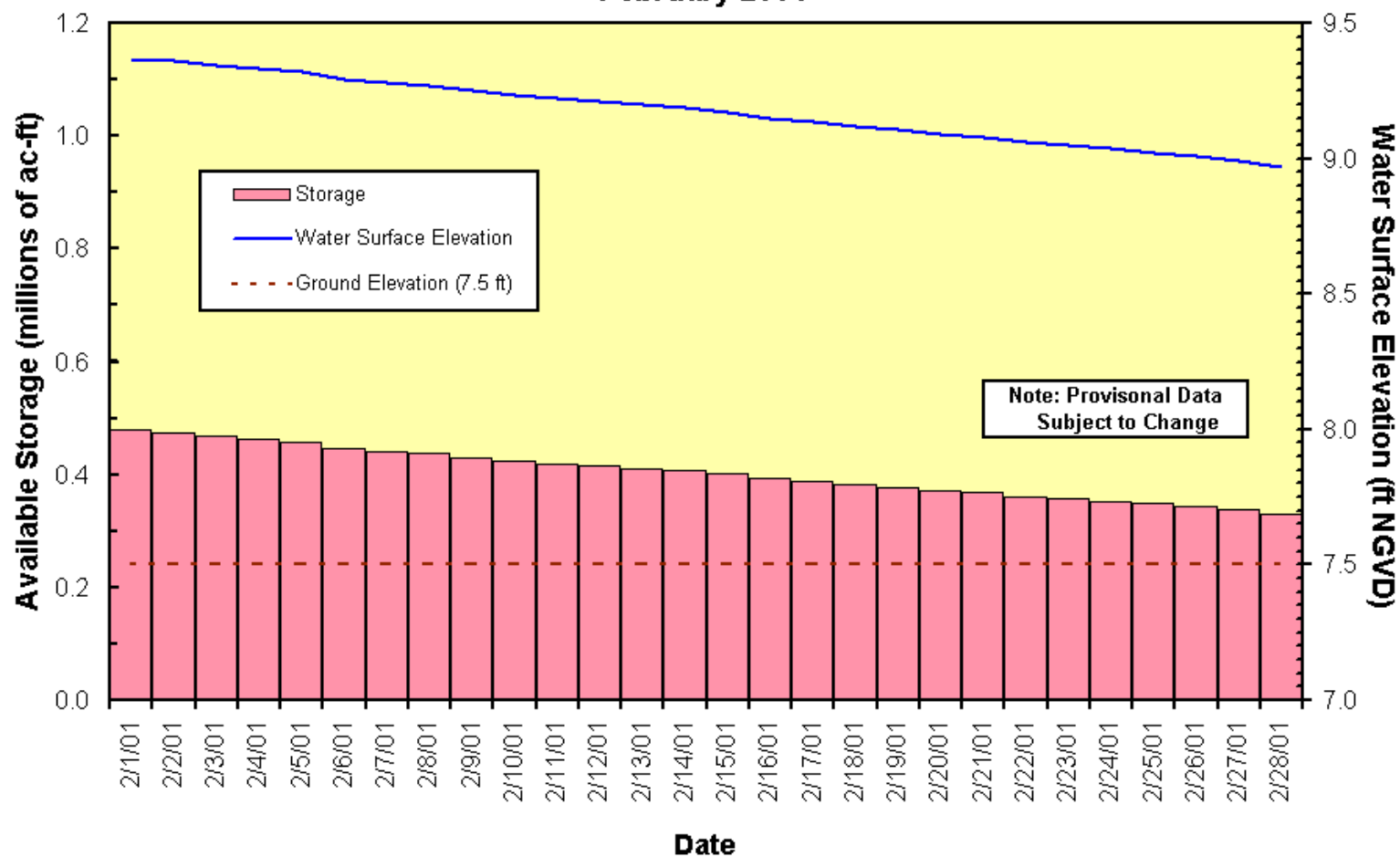


Figure 22.

Table 3.

Average Daily Pumpage					
County	February 2001 Daily Average (MGD)	February 2000 Daily Average (MGD)	November 2000 Daily Average (MGD)	February 2001 to February 2000	February 2001 to November 2000
Broward	131.62	150.78	148.22	87%	89%
Collier	50.93	59.12	55.99	86%	91%
Hendry	3.61	4.26	3.59	85%	101%
Lee	60.59	67.26	74.90	90%	81%
Monroe	16.89	18.07	16.69	93%	101%
Miami-Dade	351.17	373.83	377.66	94%	93%
Okeechobee	2.29	2.46	2.38	93%	96%
Palm Beach	197.13	215.47	221.38	91%	89%
Grand Total	814.22	891.25	900.82	91%	90%

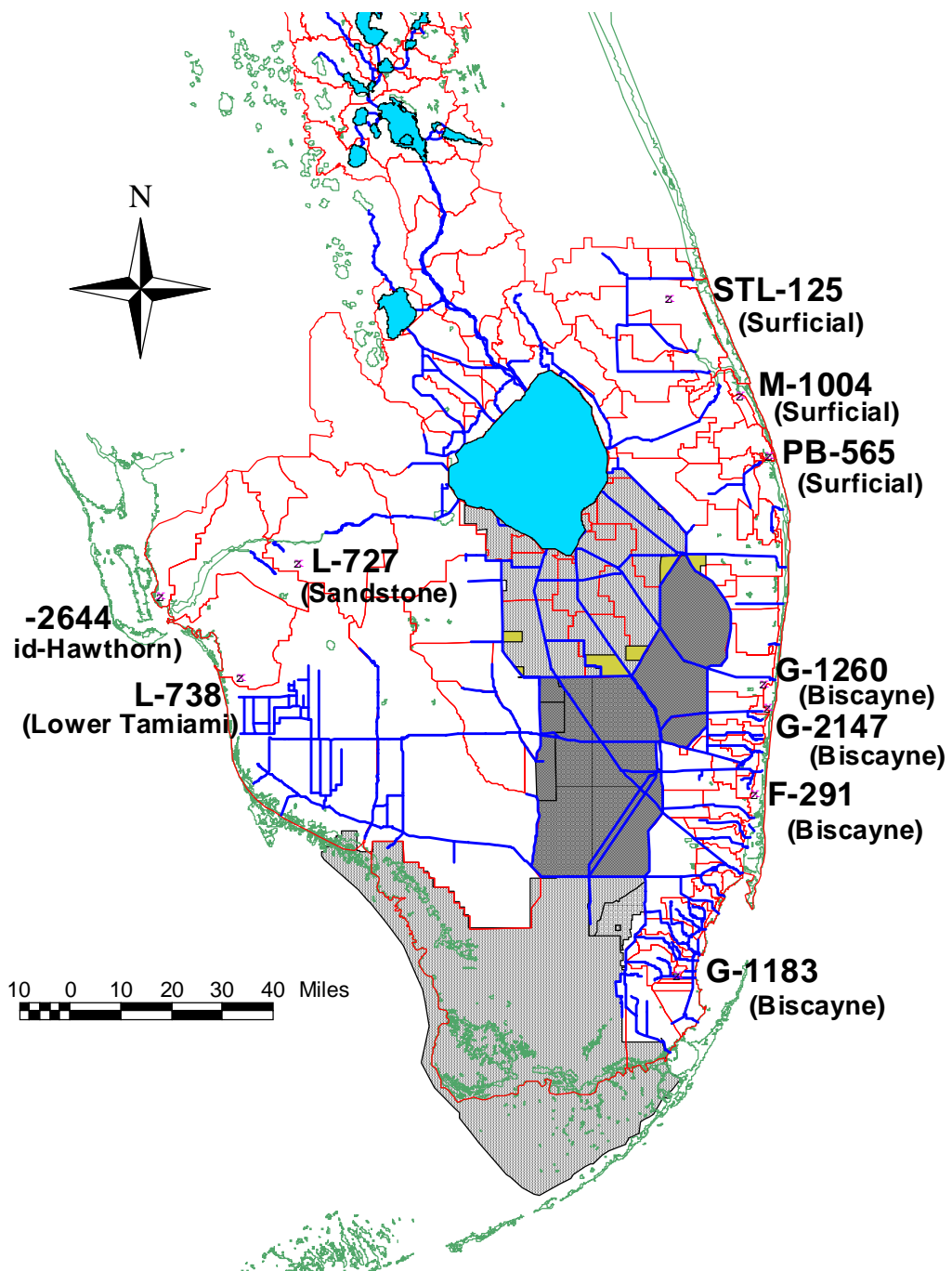


Figure 23. Groundwater Monitoring Locations

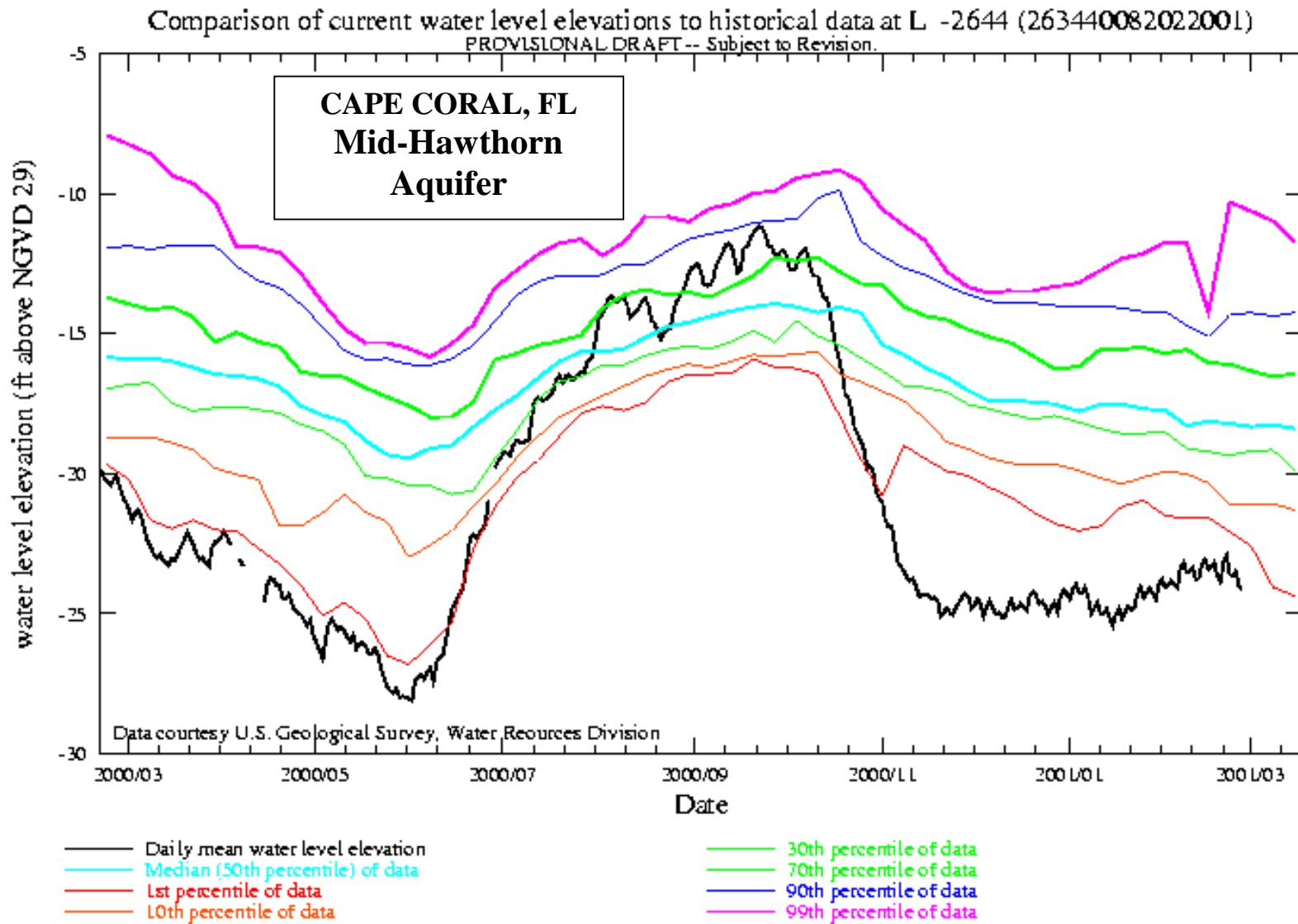


Figure 24.

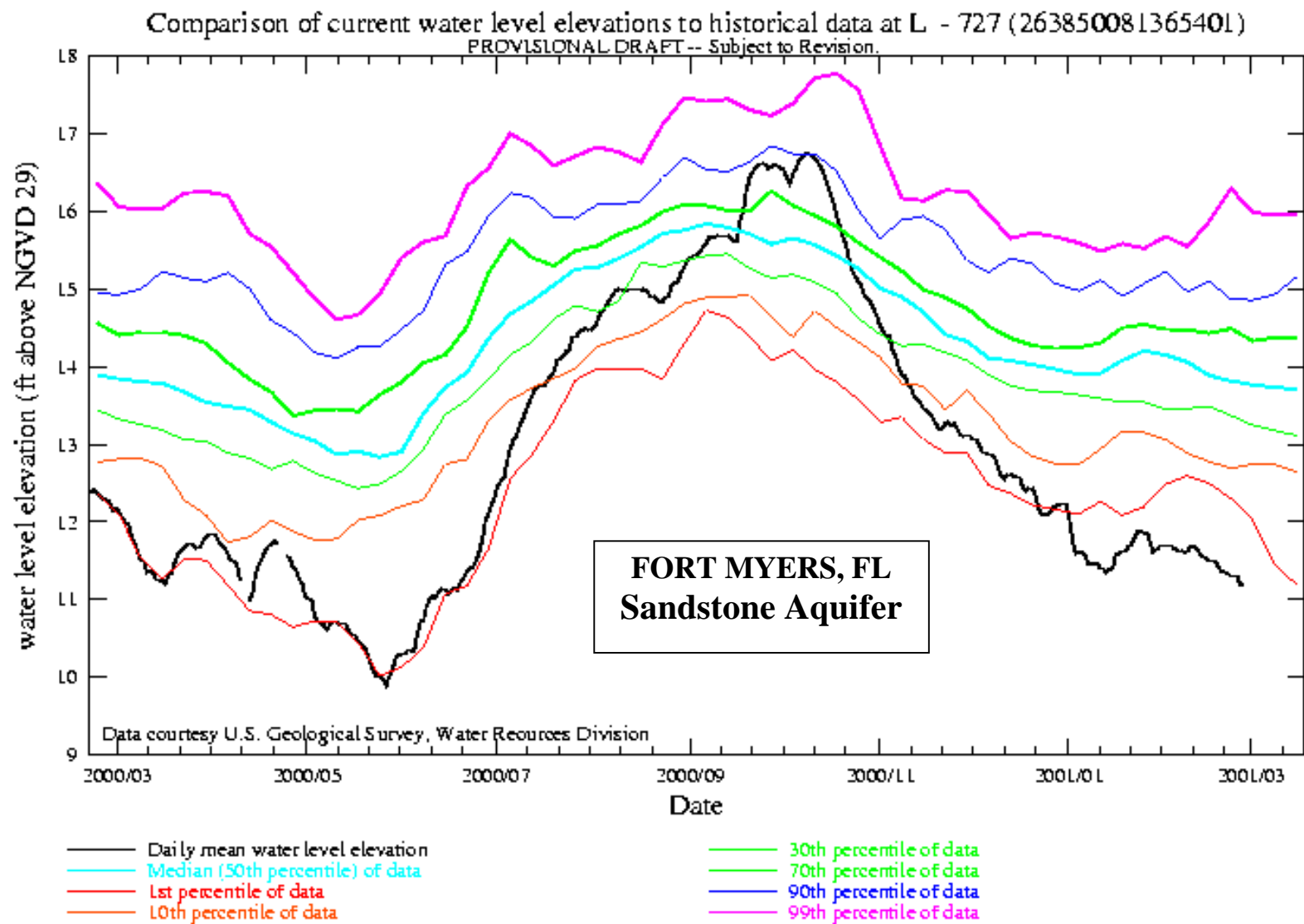


Figure 25.

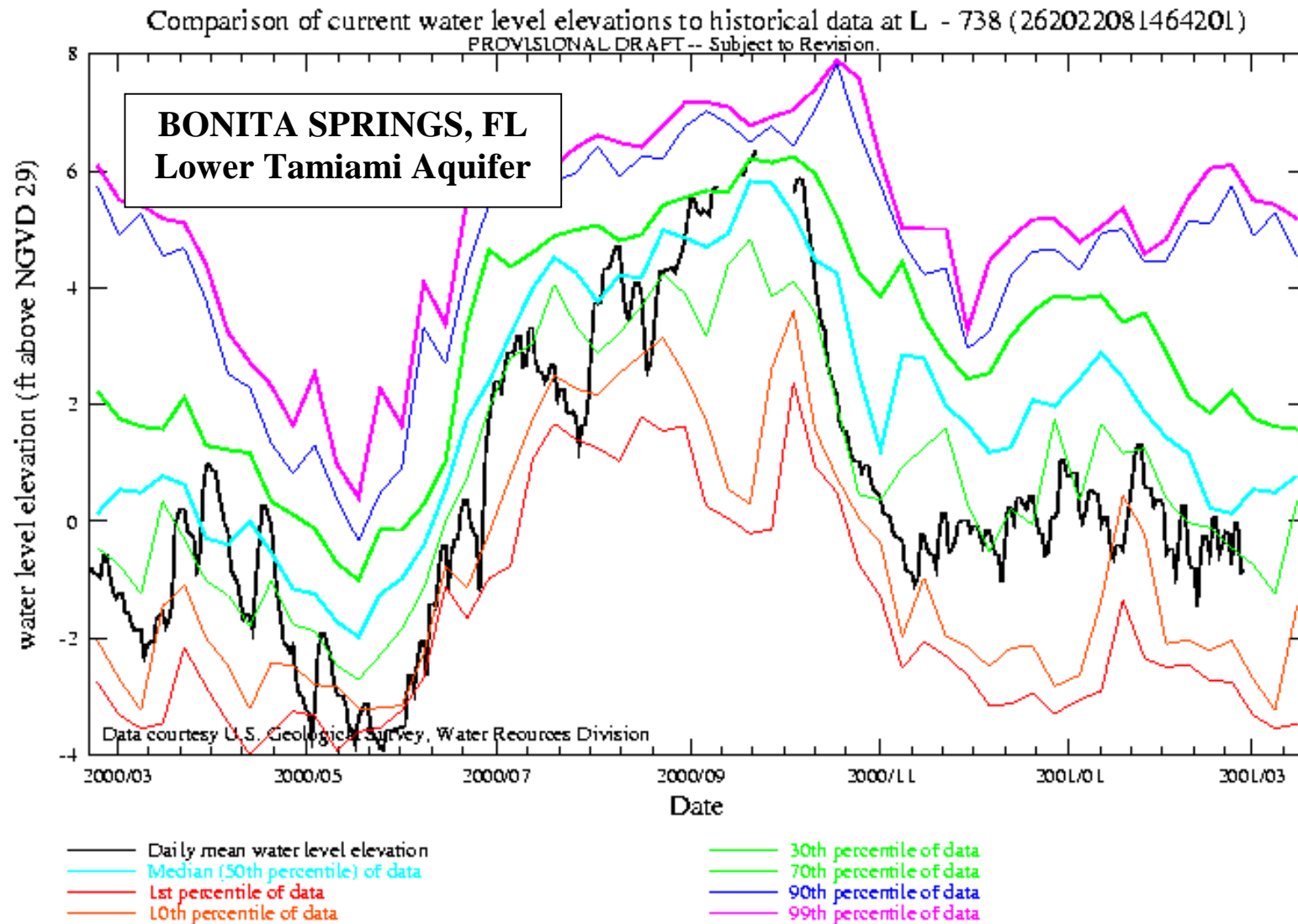


Figure 26.



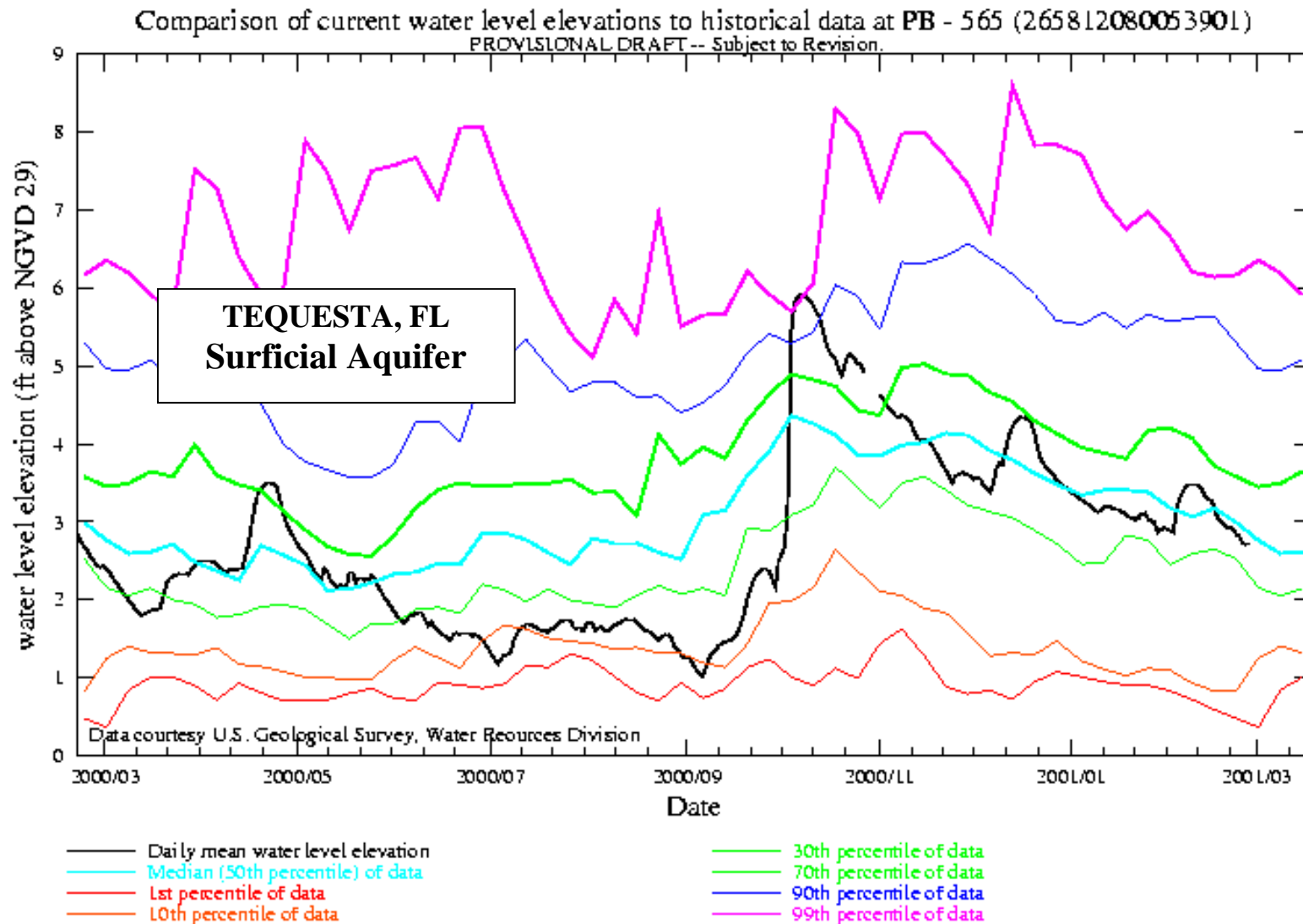


Figure 27.

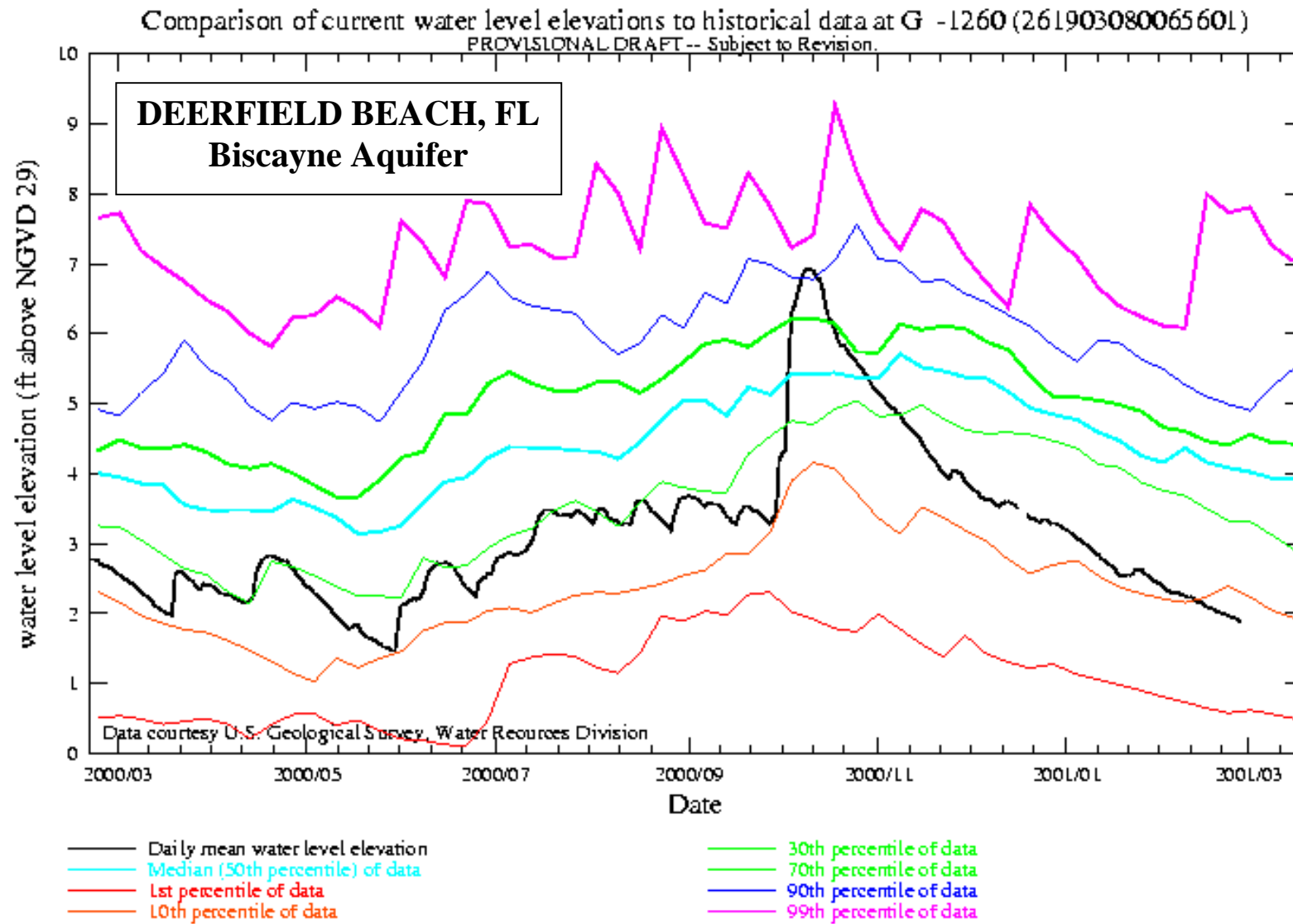


Figure 28.

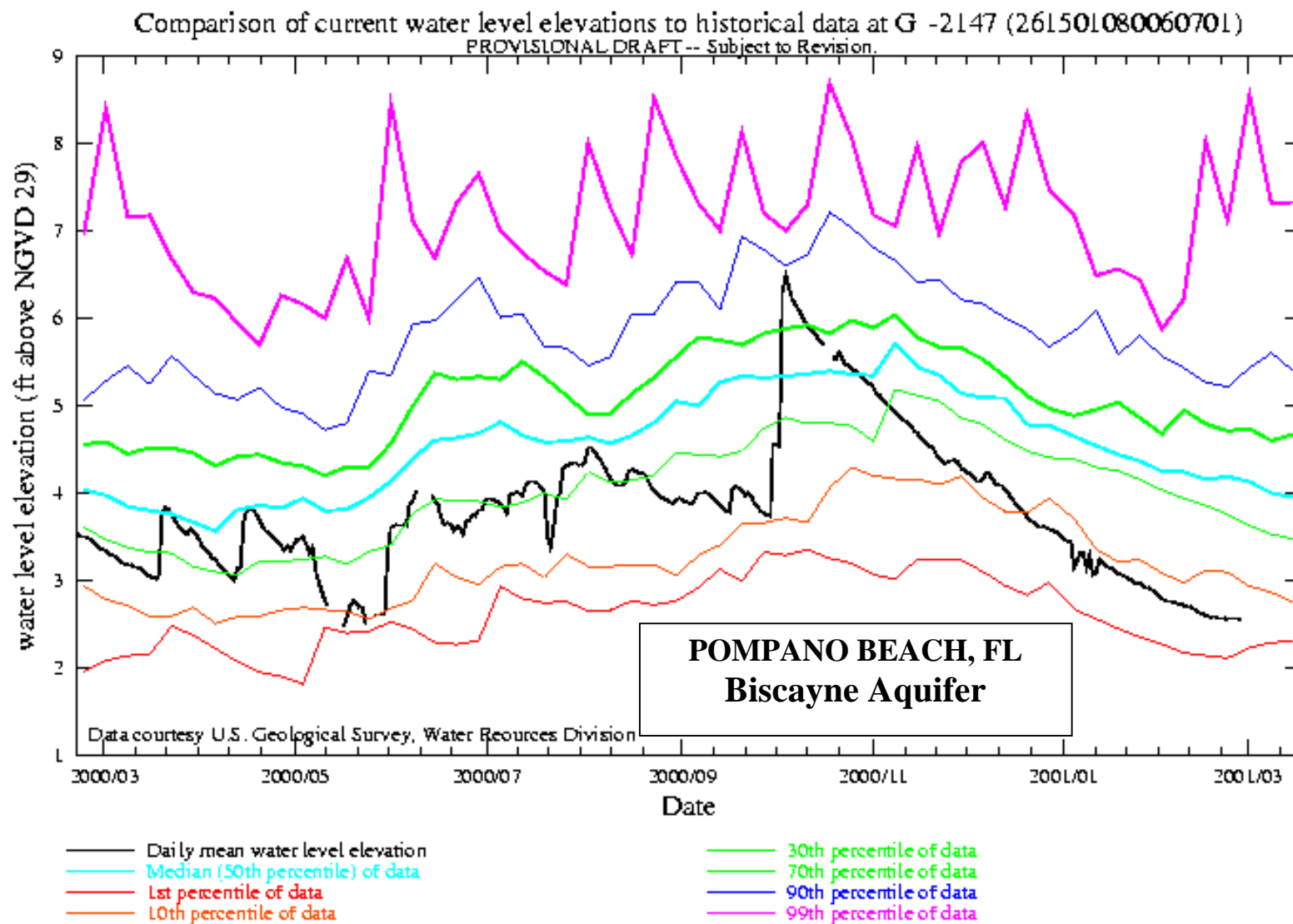


Figure 29.

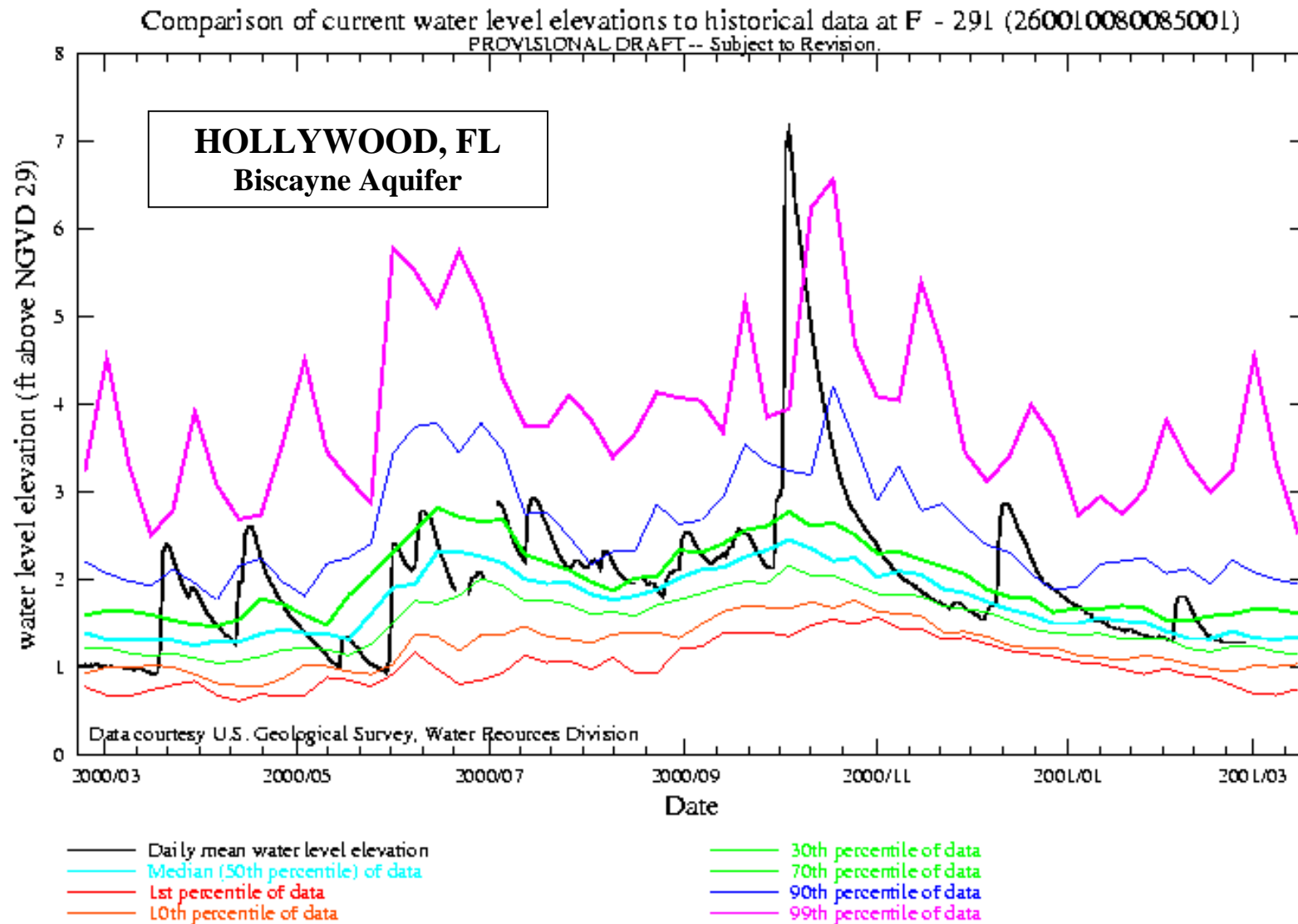


Figure 30.

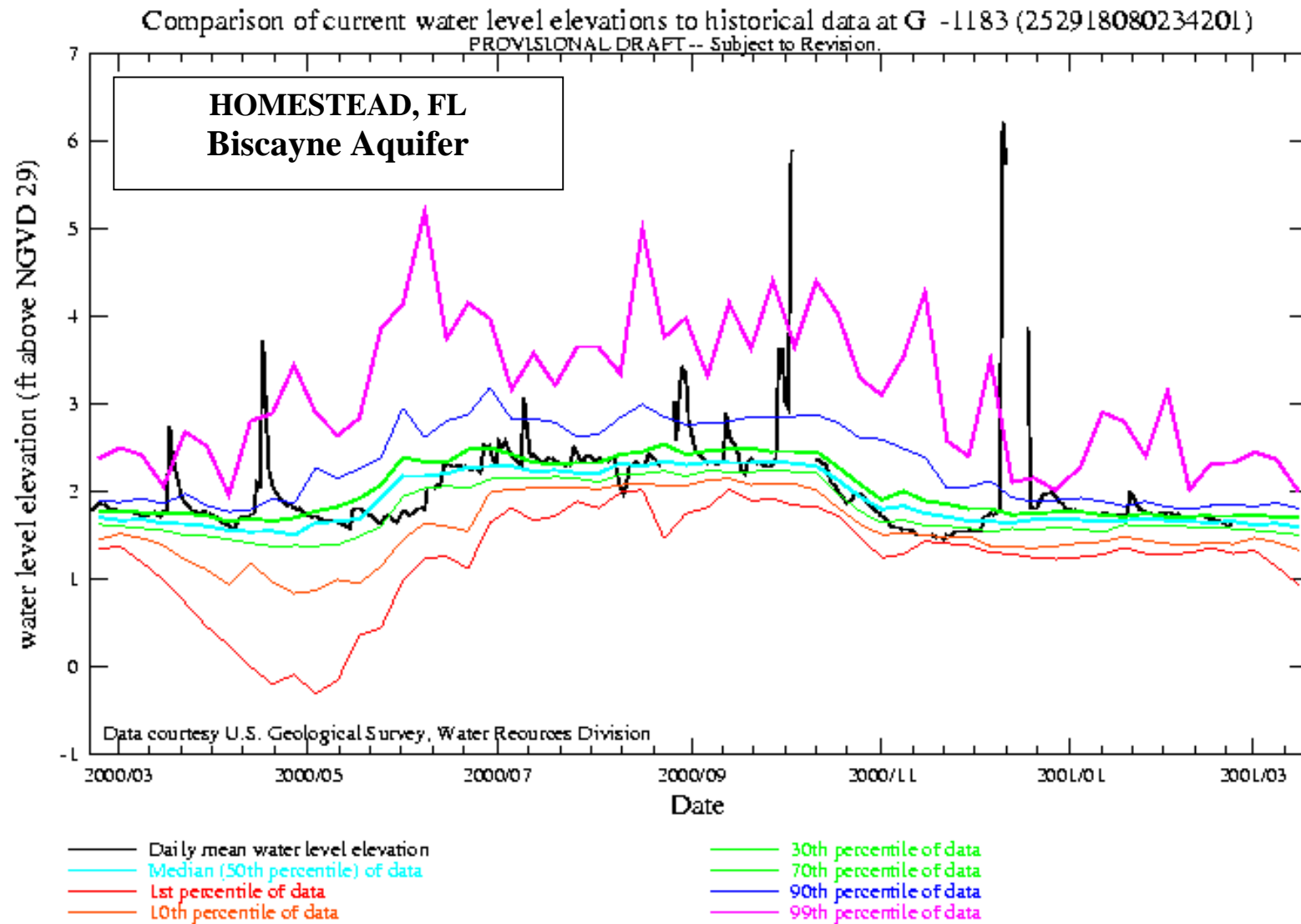


Figure 31.

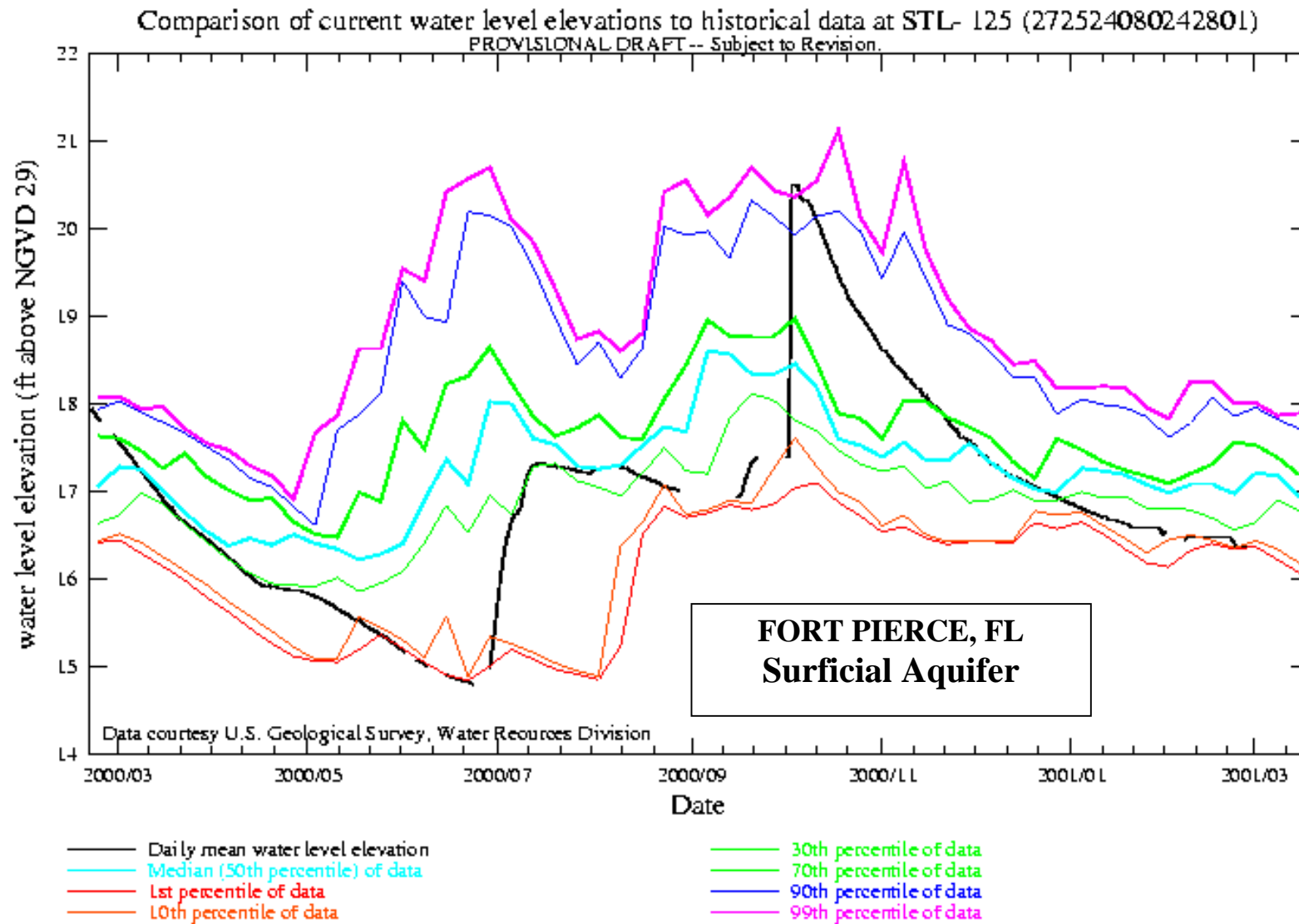


Figure 32.

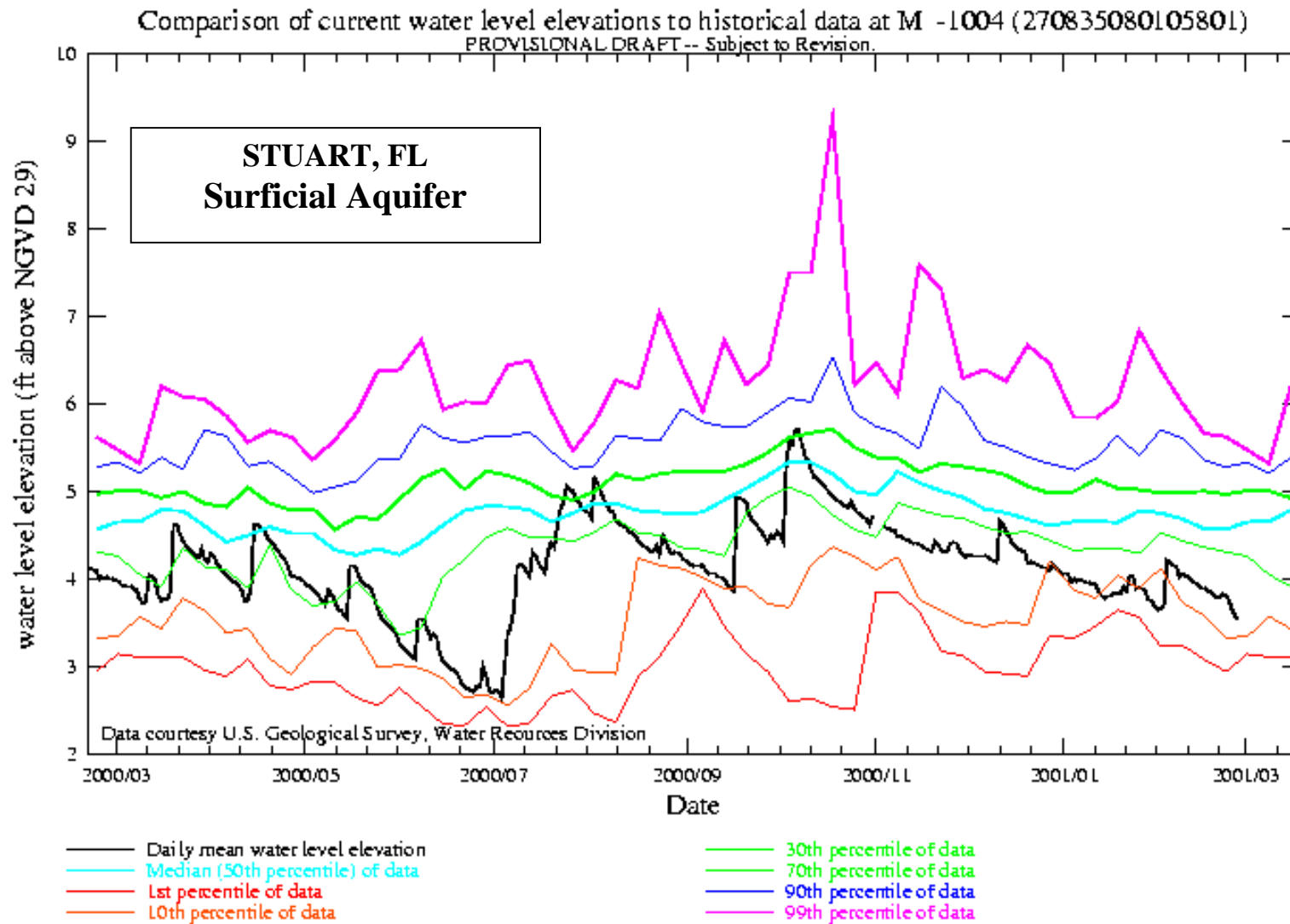


Figure 33.

## **Upper East Coast**

### *Surficial Aquifer System*

Water levels in the Surficial Aquifer system throughout the month of February were slightly below normal for the time of the year. In general the rate of decline was normal for the first three weeks, but began to increase slightly the last week of the month. In general, groundwater levels are in general approximately 1 foot below normal in the north, and close to normal in the south.

## **Lower East Coast – Miami-Dade & Broward Counties**

### *Biscayne Aquifer*

Water levels throughout the Lower East Coast were below average during February. The rate of decline in the aquifer was about normal for the first three weeks of the month, but the rate of decline increased during the last week of the month. In west central Miami-Dade County, water levels are at all-time lows and are declining at a rate that is much faster than the historical rate of decline.

## **Lower West Coast**

### *Surficial Aquifer*

The one well available in this region (L-5844 in Estero) shows that the water level in the aquifer is declining, but the rate of decline is slowing. This slowing is likely due to the fact that the extinction depth has been reached in this particular area. This means that the surficial aquifer has fallen to a point where most plant roots can no longer reach it, resulting in a slower rate of decline. The water level fell by approximately 0.30 feet in February.

### *Lower Tamiami Aquifer*

Water levels in the coastal Lower Tamiami monitor wells are holding steady, and are about where they were last year at this time. These water levels are approximately two feet above record low levels. Water levels in the interior monitoring well C-492 are close to a record low level, and continue to decline at a consistent and slow rate. Water level in the interior monitoring well is impacted mostly by recharge, while water levels in the coastal monitoring wells are impacted mostly by use. It is possible that the early implementation and strict enforcement of water restrictions has helped to maintain coastal water levels despite the very dry conditions. Water levels in the interior monitoring well are 1.5 feet lower than last year.

### *Mid Hawthorn Aquifer*

Water levels in all observation wells held steady or increased very slightly during February. Water levels are now close to the level observed last year at this time. Last year water levels were falling more rapidly during the dry season than they are this year. The early implementation of restrictions coupled with the strict enforcement this year has prevented the aquifer levels from declining.



### *Sandstone Aquifer*

Conditions in this aquifer varied by region. In eastern Lee County, water levels dropped as much as 10 feet in February. Water levels in this area are now more than 40 feet below land surface in east central Lee County. Water levels in west central Hendry County actually rebounded slightly during February; however, those in the eastern portion of the Sandstone Aquifer are at all-time record low levels.

## **Orange County**

### *Floridan Aquifer*

Water levels in the three wells for which data were available exhibited similar trends; water levels declined the first two to three weeks in February, and then remained relatively level or rebounded slightly during the last week or two in the month. Two of the three wells are very close to all time record low levels.

### **Utilities at Risk**

In order to focus resources in areas where the consequences of the drought could be most serious, Water Use Regulation Department staff identified 23 utilities as being “at risk” of service interruptions. The utilities are shown on Table 4. This “at risk” status applies to utilities with one or more of the following attributes:

1. The well field is located immediately adjacent to or above the coastal saline water interface, such that the potential exists that the well field could turn salty by June 1, 2002.
2. The Utility has no inland alternative well fields capable of meeting their current (phase II) service area demands.
3. Forecasted water levels are expected to drop to a level where the pump facilities will not function reliably.
4. The emergency interconnects with other utilities are not of a sufficient capacity to meet 50% of the current (phase II) service area needs or the interconnect is with another utility at risk.

In addition to the “at risk” status, the staff also identified an “imminent risk” status. The criteria for defining “imminent risk” include the following:

1. Monitor wells or water production facilities at the utility experience saline water intrusion at levels in excess of state primary or secondary drinking water standards.
2. Water production facilities at the utility begin to lose their supply capacity due to low water levels.

Based on this criteria, currently there are 2 utilities with an “imminent risk” status.

When a utility is classified as “at risk”, the staff notifies the utility and requires weekly water level and water quality data collected from their water use saline water monitoring network. Should the monitoring data suggest instability in the saline water interface (a precursor to the utility reaching an “imminent risk” status), District staff will schedule a

meeting with the utility and other regulatory agencies (DEP & DOH) to discuss the contingency plans of the utility and evaluate opportunities for the agencies to support the utility in implementing the contingencies. Support to the utility may include expedited permitting, in-kind services, surveying, design reviews or finding alternate sources.

**Table 4.**

Permit No.	City or Town		Status
06-00038-W	Hollywood	YELLOW	AT RISK
06-00070-W	Pompano	YELLOW	AT RISK
06-00082-W	Deerfield	YELLOW	AT RISK
06-00101-W	Hillsboro	YELLOW	AT RISK
06-00138-W	Hallandale	YELLOW	AT RISK
06-00187-W	Dania	YELLOW	AT RISK
06-01474-W	Broward Co. - 3A	YELLOW	AT RISK
13-00005-W	Florida Keys AA	YELLOW	AT RISK
13-00029-W	Florida City	YELLOW	AT RISK
13-00040-W	Miami-Dade/Rex	YELLOW	AT RISK
13-00046-W	Homestead	YELLOW	AT RISK
26-00024-W	Clewiston	YELLOW	AT RISK
36-00003-W	Lee Co. Utilities	RED	IMMINENT
36-00035-W	Ft. Myers	YELLOW	AT RISK
47-00004-W	Okeechobee	YELLOW	AT RISK
50-00131-W	South Bay	YELLOW	AT RISK
50-00234-W	Lake Worth	YELLOW	AT RISK
50-00346-W	Highland Bch	YELLOW	AT RISK
50-00454-W	Belle Glade	RED	IMMINENT
50-00460-W	Riviera Bch	YELLOW	AT RISK
50-00473-W	Pahokee	YELLOW	AT RISK
50-00506-W	Manalapan	YELLOW	AT RISK
50-00575-W	Lantana	YELLOW	AT RISK
50-01486-W	US Sugar - Bryant	YELLOW	AT RISK

## SUMMARY

Table 5 summarizes water supply related hydrologic data for lakes and Water Conservation Areas for February 2001. This report was generated based on provisional data that were available at the time it was prepared. The report provides a monthly hydrologic synopsis for the District. Questions about the report and/or the data used to generate the report should be directed to Tim Bechtel, Ph.D., at (561) 682-6392.

**Table 5. Monthly Water Supply Summary for Lakes and Water Conservation Areas (February 2001)**

<b>Lake/Area</b>	<b>Monthly Inflow acre-ft</b>	<b>Monthly Outflow acre-ft</b>	<b>Monthly Evaporation inches</b>	<b>Beginning Stage ft NGVD</b>	<b>Ending Stage ft NGVD</b>	<b>End of Month Total Storage ac-ft</b>	<b>End of Month Available Storage ac-ft</b>
<b>Lake Kissimmee</b>	----	<b>0.00</b>	----	<b>48.89</b>	<b>48.69</b>	<b>212,080</b>	-----
<b>Lake Okeechobee</b>	<b>1,865</b>	<b>36,818</b>	<b>4.0</b>	<b>10.86</b>	<b>10.56</b>	<b>2,222,120</b>	<b>338,120</b>
<b>Lake Istokpoga</b>	----	<b>20,301</b>	----	<b>37.59</b>	<b>36.58</b>	<b>105,450</b>	----
<b>WCA1</b>	----	<b>19,030</b>	----	<b>15.92</b>	<b>14.29</b>	<b>35,020</b>	<b>28,620</b>
<b>WCA 2</b>	----	<b>3,781</b>	----	<b>11.02</b>	<b>10.35</b>	<b>24,220</b>	<b>-3,780</b>
<b>WCA3</b>	----	----	----	<b>9.37</b>	<b>8.97</b>	<b>359,000</b>	<b>331,000</b>